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Ideological Aggression Against Afghanistan

18010004a Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 7, Jul 87 (signed to press 6 Jul 87) pp 7-10

[Article, published under the heading "General Problems of the Armed Forces," by Lt Col V. Roshchupkin: "Ideological Aggression Against Afghanistan"]

[Text] For a decade now, international imperialism and the local reaction have been waging an undeclared war against democratic Afghanistan. As is known, the national democratic revolution which commenced in Afghanistan in April 1978 proclaimed as its goal "the establishing of a new society based upon principles of peace and freedom, progress and justice, fraternity and equality." Over the passed time, the Afghan people have achieved indisputable advances in carrying out democratic, antifeudal transformations. But such development of events has not been at all to the liking of the enemies of the Afghan people who have put up fierce resistance to the progressive changes occurring in the nation.

In the first stage, the Afghan revolution itself protected itself against hostile forces. But when the scale of outside armed intervention into the internal affairs of Afghanistan rose sharply and the revolutionary victories of the people came under direct threat, the Afghan government turned to the Soviet Union for aid, including military. The USSR, in accord with the Treaty on Friendship, Good Neighborliness and Cooperation, as well as proceeding from its interest in ensuring the security of its southern frontiers, responded favorably to this request.

The events of past years have convincingly confirmed that the imperialist powers, primarily the United States, as well as certain other countries who have also participated in aggression against Afghanistan bear direct responsibility for the conflict situation in Afghanistan. Precisely they have put together the bandit formations, they train and arm them and send them into the territory of democratic Afghanistan. At the same time, they have initiated wide-scale ideological aggression against the freedom-loving Afghan people and this has assumed the scope of "ideological warfare" with its inherent perfidiousness, refined mean strategems and evil slander.

American imperialism is the initiator, inspirer and coordinator of the unrestrained slanderous campaign against Afghanistan. Characteristic of this is an intentional distortion of facts and events, inflammatory rhetoric and irresponsibility which again emphasizes the amoral approach of the U.S. leadership to the fate of the Afghan people. This has been carried out under the direct leadership of the higher official levels in Washington, including the White House, State Department, Pentagon and Central Intelligence Agency (CIA). The entire gigantic apparatus of foreign policy propaganda and influential mass information media are involved in this ideological aggression.

Their subversive activities are coordinated and directed by a special group headed by the Deputy Secretary of State for Political Affairs, M. Armacost. The United States has set up around 20 various committees, federations and funds which are involved in collecting money for the Afghan counterrevolution, they organize propaganda shows for its support and disseminate disinformation on the actual situation in the country. Major scientific research centers are also involved in these activities.

All these "psychological warfare" bodies are endeavoring to defame the April Revolution in Afghanistan, to justify the undeclared war being waged against it, to discredit Soviet policy under the fabricated pretext of a struggle against the "Soviet threat" to broaden the American military presence in this and other regions of the world and continue intervention into the internal affairs of different states. The newspaper *Kabul New Times* has termed the "psychological warfare" against Afghanistan as "one of the broadest CIA operations in recent years."

In August 1986, the U.S. Information Agency (USIA) announced a number of programs for escalating the "psychological warfare" against Afghanistan. Around $500,000 were allocated to implement these. From this amount over $180,000 went to the Journalism Faculty of Boston University. It was given the job of quickly training professional "propagandists" from dushman specially recruited in Pakistan, that is, to call a spade a spade, professional liars and instigators. The plan was to employ them to disseminate U.S.-fabricated falsifications of an anti-Afghan and anti-Soviet sort not only in Afghanistan but also beyond.

Some $310,000 have been allocated for establishing a so-called "Afghan news service." This subversive "service" has been conceived of by its organizers as a propaganda mouthpiece for the terrorist bands committing bloody raids from Pakistan on Afghan territory. The realization of this anti-Afghan plan has been entrusted to the American King Features Information Syndicate. The newspaper *New York Times* has announced that the emissaries of Boston University and King Features have visited Pakistan and held talks there together with representatives of the CIA, the Pakistani authorities and the

dushman. Thus, a propaganda cover is being provided for the annually broadening subversive activities of American imperialism against Afghanistan.

In psychological operations the organizers of the undeclared war have placed their main bet on airwaves piracy. They realize that a predominant majority of the Afghans, particularly in rural localities, is still illiterate. This is the result of the very difficult heritage of the age-old era of feudalism and reaction. This is why the radio for many is the main source of information. In the remote villages which are far removed from large towns, the usual scene is a group of peasants squatting on their heels around a radio and listening closely to the news.

The airwaves in Afghanistan are literally blanketed by the subversive imperialist radio centers. Bursts of lies and hatred, slander and threats are unceasing. Broadcasts are in all the main languages of the Afghan nationalities. Prior to the war, the Western mass information media rarely mentioned Afghanistan in their materials. Not a word was said about the flagrant poverty or illiteracy. But now, as if upon command, the "radio voices" shed crocodile tears over the "calamities" of the Afghans since the April Revolution. At the same time, the Western "truth seekers" say not a single word about what the revolution has brought the simple people, not a word about its noble aims, that already 1.5 million Afghans have become literate, that women for the first time are equal in their rights to men and so forth.

Many millions of dollars are being spent on subversive ideological activities. Just the volume of hostile radio broadcasts in the languages of the Afghan nationalities is around 300 hours a week. Broadcasting to Afghanistan are Voice of America, BBC, Radio Pakistan (from Peshawar, Islamabad and Karachi) as well as the radios of Iran, China, Israel, Egypt and Saudi Arabia. Since the April Revolution, the length of subversive broadcasts against the people's authorities of Afghanistan has increased by 50-fold.

In carrying out the ideological aggression against Afghanistan, a particular role has been assigned to Pakistan from whence eight radio stations carry out hostile propaganda. In Lahore and Peshawar they have set up "mobile information centers" the main task of which, as has been pointed out by the Indian journal *Link*, is to disseminate fabricated slanderous materials about events in Afghanistan. The Pakistani government has given approval for opening up in its nation affiliates of Radio Liberty and Radio Free Europe which are specialized in ideological provocation a well as radio stations under the pretentious name of "Radio Free Kabul."

Using CIA funds, they have established lie mills such as the Afghan Press Agency with headquarters in London and departments in Peshawar and Rawalpindi, the Afghan Documentation Center as well as the United Mujaheed Press in Pakistan and others. For conducting "psychological warfare" directly on Afghan territory they have set up special subdivisions staffed by personnel trained in training centers and equipped with propaganda equipment. At their disposal are printing equipment, radios, teletypes and duplicating equipment. All of this, including paper and inks, comes from the Western countries. At present, various Afghan counterrevolutionary groupings publish more than 70 newspapers, magazines and weeklies. These come out in Pakistan, Iran, the United States, West Germany, Italy and Great Britain in various languages (Dari, Pushtu, English and Arabic). There have also been announcements about the organizing of illegal mobile radios directly in Afghan territory and for this purpose small-sized radio transmitters are being delivered from the United States, West Germany and France for the bandits. The production of false propaganda films goes on continuously.

With each large band there is a group of specially trained dushman who conduct subversive work in the mosques, in the markets and in other well populated places. They disseminate antigovernment literature, posters, leaflets, tape cassettes with inflammatory slogans and appeals.

Recently there has been an increase in the ideological subversion against the servicemen of the Afghan Army. The effort is made to persuade them that the dushman have been successful everywhere and that the only solution is to go over to the side of the counterrevolution. This is done in order to confuse the Afghan soldiers, to break their will, to spread doubt and fear, to attempt to split the army from the people, to collapse it from within, and to spread strife and hostility in it. The subversive broadcasts to Afghanistan are full of evil slander of the Soviet soldiers who are carrying out their international duty as well as of our country and its policy.

Standing out in their particular cynicism and cruelty are the TV films made on Afghan land upon the assignment and with the participation of overseas emissaries with the aim of compromising the Afghan soldiers. Dushmen dressed in the uniform of the Afghan Army throw peasants into the flames, kill the activists of communist power and torture women and children. These and similar video lies have been specially filmed and then duplicated for subsequent showing in the West. Captured dushman have said that in Pakistan there are entire groups of American television workers engaged in fabricating evidence about the "cruelty" of Afghan soldiers against the peaceful population.

In its subversive ideological activities, the foreign and domestic counterrevolution make extensive use of archaic, traditional forms of the mass awareness of the Afghan population. They speculate actively on the religious views of the people, they play on unsettled nationality question inherited from the previous regimes and fan separatist tendencies. Certainly the morals and customs of the Afghans, particularly in the countryside, have not undergone any abrupt changes over the last century. Even now the unique way of life is controlled by the dogmas of Islam.

In considering this, the imperialist mass information media constantly foster the notion that the ideas of the April Revolution are supposedly incompatible with the postulates of Islam and the government policy is encroaching on the interests of the priests and believers generally. At the same time, they stubbornly overlook the fact that the attitude of the authorities to religion is emphatically respectful. The customs and traditions of the Moslems are supported in every possible way and they are helped in organizing pilgrimages to the Moslem holy places in the nation and abroad. The religious leaders and theologians are held in great respect. Over the last 4 years alone, the government has spent around 1 billion afghans on repairing and building mosques and providing help to the priests. Naturally the believers, and this is virtually the entire population of the nation, cannot help but see, understand and praise this.

With the proclamation of a policy of national reconciliation by the Afghan government on the threshold of 1987, the subversive activities of the upper clique of counterrevolutionary forces were further intensified. The scale of the slanderous inflammatory campaign against Afghanistan was widened and the emphasis was placed on discrediting the new policy of the Afghan leadership. The heads of the bands supported by the foreign special services rejected the olive branch extended by Kabul, having ordered the "commanders in the mountains" to intensify actions against the legitimate authorities.

The program of national reconciliation which is being more and more widely supported among all strata of the population evoked a hostile response in Washington. The United States immediately announced plans to deliver a new batch of Stinger antiaircraft missiles and an increase in the aid to the dushman to $630 million in 1987. They resented the fact that events in Afghanistan have not developed according to the scenario that they wished and that they had to retreat before the will of the Afghan people who decisively elected for the path of peace. In endeavoring to maintain tension in the area, the imperialist circles and the local reaction have endeavored to impede a political settlement for the status of Afghanistan and to block those positive trends which are presently appearing.

As for the position of the Soviet Union, it proceeds from the necessity of resolving the problem by political means on the basis of halting outside intervention. The process of national reconciliation and a settlement for Afghanistan has already begun. It is difficult and complicated but underway. The main thing, as was emphasized by Comrade M.S. Gorbachev on 30 March 1987, is not to put a wrench in the works, to halt any interference into the affairs of this sovereign country which wants and will be neutral and nonaligned. But from certain circles in the West, we see, however, only a build-up of forces, including the means of psychological warfare designed to undermine the process of normalization.

But no matter how clever the enemies of Afghanistan are in propagandizing lies and hate, "you cannot cover the sun with the skirt of your coat." This is now the Afghan saying goes. The counterrevolution and its masters fear the truth like the plague. With good reason the bandits hunt down the workers of the Afghan mass information media. In recent years, the terrorist counterrevolutionaries have killed 45 journalists and television announcers who are recognized by the entire nation.

The following fact is indicative. When the military regime in Islamabad, under overseas pressure, initiated bloody aggression against the Pushtu tribes, the dushman began disseminating pamphlets printed in the Pushtu and Dari languages with the following content:

"Again we must inform those who have radio receivers so that they are aware, remember and do: to listen to broadcasts from Kabul is a great sin. In the future this action will be punishable by a fine of 10,000 afghans or decapitation."

The enemies of the revolution hate the truth, and they fear it because it is stronger than lies. The truth is arriving in the most remote villages and is making its way to the hearts of the simple Afghans. This truth is carried by the Afghan mass information media which over the years of the April Revolution have undergone great development. Presently there is radio broadcasting in 13 Afghan provinces and TV relay stations have been installed in 6. Afghanistan is able to view TV broadcasts from Moscow (Kabul receives 2 programs of Soviet television). In 1978, the nation published double the number of books than over the 50 years before the revolution. This has been largely possible due to the aid of the USSR and other fraternal socialist states.

Since April 1978, over 300 industrial installations have gone into operation in Afghanistan and many of them have become the flagships of national industry. Hundreds of new schools have been built and there are 19,000 courses in operation to eliminate illiteracy. Over 300,000 peasant families have received free plots of land and in the near future another nearly 80,000 peasants will become landowners.

The progressive changes which have entered the Afghan land with the April Revolution are opening the eyes of people. More and more they are beginning to realize for what the Afghan Army is fighting and why there are Soviet soldiers on Afghan land. There are many people who initially did not accept the revolution but who now, after the declaration of the Kabul Truce in January 1987, are coming over to its side. Gradually, a nationwide dialogue is being established with the participation of representatives from different political forces. The armed struggle has already been abandoned by many thousands of its participants and scores of opposition groups, and talks are underway with others for ceasing hostilities. By mid-April 1987, around 40,000 Afghans who were outside their country returned to Afghanistan.

There can be no doubt that the attempts to thwart the policy of national reconciliation with the aid of armed force and ideological subversion are doomed to defeat. The guarantee for this is the determination of the Afghan people, the consistent line of the Afghan government and the international support from the USSR and all the peace-loving forces in the world.

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Soviet Military Journal on U.S. Binary Program

18010004b Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 7, Jul 87 (signed to press 6 Jul 87) pp 11-13

[Article by P. Akimov: "Fact and Fiction About the U.S. Binary Program"]

[Text] At the 27th Party Congress, the banning and destruction of chemical weapons were placed in the category of crucial elements in the fundamental basis of an all-encompassing international security system formulated and proposed by the Soviet Union. The USSR, in continuing to build up efforts to halt the arms race, is steadfastly carrying out a consistent, principled and business-like course of achieving an international agreement on banning the development, production and stockpiling of chemical weapons and eliminating these from military arsenals. In April 1986, at the Geneva Disarmament Conference, our delegation submitted constructive proposals concerning the problem of preparing a convention for the complete banning of this barbarian means of human destruction. The adoption of these would eliminate the existing differences of opinion and make it possible to work out a text for the convention which would ensure the total destruction of chemical weapons by the end of the current century.

An important component in our new proposals has been the questions of monitoring the observance of the provisions of the future convention by its participants. The Soviet Union has proposed that the destruction of the stockpiles and the shutting down of enterprises producing chemical weapons, including private firms and transnational corporations, would be supported by strict monitoring, including international on-the-spot inspections. At the same time, attention has been drawn to the inadmissibility of employing private firms for developing and producing chemical weapons, including components for the so-called binary weapons.

A diametrically opposite position has been continuously supported by the United States which for some 50 years has delayed in ratifying the 1925 Geneva Protocol on banning the employment of suffocants and other toxic gases in wars. The United States has waged chemical warfare against the peoples of Indochina and this has been unprecedented in terms of duration and scale of covered territory, the quantity of employed toxic chemical agents as well as in terms of the immediate results and distant consequences for the health and habitat of the peoples of this region. In taking advantage of the fact that the Geneva Protocol does not ban the use of chemical weapons as a retaliatory measure and, consequently, remains an escape hatch for developing and manufacturing toxins as well as the equipment for their combat employment, the United States has not rested in its efforts to build up chemical weapons. New affirmation of this is the Pentagon's intention to spend during the current fiscal year $0.5 billion in addition to the previously allocated funds for modernizing the U.S. chemical arsenal and replacing a portion of the obsolete chemical ammunition with even more lethal.

Being forced into international talks on a complete banning of chemical weapons, Washington has in fact continued a duplicitous policy. On the one hand, it has participated in talks on concluding a chemical convention (here artificial impediments have been created on the path of achieving international agreement), and on the other it is carrying out a multibillion-dollar program for the chemical rearming of the army. This program, according to the estimates of foreign specialists, over the next 10 years will require at least $12 billion. Confirmation of the duplicity of the White House on the given question has also been the article by the Director of the Arms Control and Disarmament Agency, Edelman, in one of the American journals where he has frankly stated that the possession of chemical weapons corresponds to U.S. interests and for this reason the administration does not intend to abandon the chemical rearmament programs.

The core of the U.S. Administration's policy in the area of chemical rearmament is the development, production and stockpiling of binary chemical ammunition. The essence of binary technology is that the final stage in the synthesis of the toxin which occurred previously in a plant vessel is shifted to the body of the ammunition which in this instance carries out an additional function as a single-use chemical vessel. Its design provides intense mixing of the synthesis semiproducts at the moment of firing the round or dropping the bomb. As the synthesis semiproducts they use the appropriate substances which, being mixed in certain proportions, in a few seconds are turned into combat toxins.

As foreign military specialists have emphasized, binary technology does not create a new toxin. Each of these can also be obtained under factory conditions and then used for the unitary loading of the chemical shell. Here the individually taken ammunition in a binary form in terms of the ability to cause losses for the enemy does not exceed but even is inferior to its prototype in the unitary form.

What has forced the American military specialists to give preference to binary ammunition and abandon the production and stockpiling of traditional chemical ones?

What political benefits do the U.S. ruling circles intend to gain from introducing seemingly and insignificant technological innovation, that is, carrying out the chemical reaction for the synthesis of the toxin in the shell body and not in the vessel of a specialized plant?

The binary chemical weapons have been widely publicized and praised in the NATO countries as safe to manufacture, store and transport. The very fact of switching to the production of this weapon of mass destruction is hypocritically portrayed as a supposed humane act and as a manifestation of concern for those who produce, store and maintain this barbarous weapon. Moreover, the Pentagon is supposedly concerned for the safety of the Europeans and potentially the peoples of other nations on whose territory the United States maintains or plans to additionally deploy enormous stocks of the lethal weapon. The presence of such publicizing of the program for chemical rearming cannot help but raise the question of whether something more is concealed behind the binary program. Possibly, of prime importance is not the technological but rather the political gains and benefits planned by the U.S. strategists.

The foreign press, in endeavoring to lift the curtain on the secret intentions of the American strategists in the area of chemical rearming based on binary technology, has given a number of facts. Thus, it has been stated that the first patent for a binary-charged chemical bomb was drawn up in 1940. Its warhead contained magnesium arsenite (a solid) while in the tail was a container of sulfuric acid. In striking the ground, the acid came into contact with the arsenite and as a result of this chemical reaction a gaseous toxin was released in the form of hydrogen arsenide. While bombs with gas-forming substances such as the hydrogen arsenide require the use of a strong housing and complex gaskets, binary technology makes it possible to avoid these difficulties at a price of losing only a certain portion of the ammunition's filled volume for inert substances and elements of a more complicated design.

In 1947, the United States took a decision to build a plant producing sarin based on technology borrowed from the conquered Nazi Germany at the Rocky Mountain Arsenal (Denver, Colorado). All the U.S. efforts in the area of developing chemical weapons at this period (the start of the Cold War) were aimed at developing stocks of neuroparalytic toxins before other countries. A memorandum drawn up in 1949 by the American military chemist, V. Green on the advantages of a binary approach did not attract attention. In endeavoring to achieve superiority in the area of chemical weapons, the United States felt it advantageous not to be diverted from the development of the basic technology and not to waste time on researching and developing the binary ammunition, and at the beginning of the 1950s the plant at the Rocky Mountain Arsenal began producing sarin. In 1954, at Edgewood Arsenal, the U.S. Army developed a binary technology for synthesizing amiton, the predecessor of VX, and subsequently a process for producing unitary VX which was superior to sarin and tabun in toxicity. In 1961, a plant in the town of Newport, Indiana, began producing the new toxin.

A fundamental change in binary technology in the United States occurred at the start of the 1970s, that is, immediately after the collapse of U.S. chemical warfare in Indochina, when the R. Nixon Administration, under the pressure of the world community, was forced to sign the 1972 Biological Convention as well as participate in talks on a full ban of chemical weapons.

Thus, the adopting of the program to produce binary chemical weapons as a general line in the chemical rearming of the u.S. Army is directly linked to the start of international talks on the problem of a complete ban of chemical weapons. At present, many instances have become known on the basis of which foreign specialists have concluded that the program also provides a version for when further refusal by Washington to join the International Convention on Chemical Weapons will be impossible.

For an extended time the true status of the binary program was kept secret. Only in 1969 did an official of the Department of the Army, Col Osik, at hearings before one of the Congressional subcommittees for the first time state: "We feel that in the next 5 years we will produce a binary type of weapon.... If we achieve this, then, it seems to us, that in the future there will be no necessity of having the Rocky Mountain Arsenal where, as is known, nerve gases are being produced."

In the opinion of a well-known English specialist in the area of chemical weapons and the problems of their complete banning, Robinson, the essence of the new conception of chemical rearming as published in the United States is that since the binary components are relatively nontoxic, in producing them enormous expenditures are not required to provide safety measures. This will make it possible to purchase them under contract and the Pentagon will not need to maintain expensive and narrowly-specialized plants producing nerve gases. In the assessment of its military specialists, the U.S. chemical industry is sufficiently strong and capable of providing the production of an enormous amount of binary components in a rapid period of time and, consequently, large stockpiles of toxins need not be maintained.

The foreign press has pointed out that the problems concerning the safety of the binary components assumed importance not only on the level of ensuring safety in handling them in transporting and storage. The relative safety of the semiproducts of binary synthesis is of fundamental significance primarily in organizing their industrial production, since the structure of the industry producing chemical weapons can be fundamentally changed. The U.S. binary program has begun to disclose a "dual bottom."

The military chemical potential of the United States was developed at the end of World War I. At the same time, all types of special production were concentrated at Edgewood Arsenal of the U.S. Army (Maryland) and here they produced both weapons of attack and the means of defense against them. During the period between the two world wars, there was a complete transfer of the functions of manufacturing the gas masks, protective clothing and decontamination equipment from the military department to the hands of private firms. In the 1950s, the Pentagon began on a mass basis to involve he universities, institutes, colleges and laboratories in developing new types of chemical weapons as well as modern methods of their combat employment. However, it kept for itself the production of all types of chemical weapons.

Later (in the 1960s and 1970s), they began to transfer not only the development but also the production of relatively less toxic poisons to private firms. Thus, during the years of the U.S. aggression in Indochina, Dow Chemical Corporation not only developed but also manufactured 50 tons of the new BZ psychochemical toxin. The implementation of a production program for binary chemical weapons has become a further step on the way to he Pentagon's complete transfer of the production of chemical warfare agents, including the most recent types of chemical weapons, to the hands of private firms. The basic U.S. potential for developing chemical weapons and the methods of their combat employment now has almost completely shifted from the military chemical laboratories to the laboratories of universities, institutes, colleges and firms. This, as foreign specialists feel, will entail an influx of new forces and as a result of this, new ideas, technologies and approaches will appear in the area of developing evermore advanced barbarian types of chemical weapons.

The carrying out of the program for producing binary weapons remains a general area in the U.S. chemical rearming. They have already developed or are developing a binary version of the main calibers of artillery shells, the warheads of guided and unguided missiles, bombs, aircraft sprayers and other types of weapons. There are also plans to provide the designated delivery systems with binary chemical elements of both sarin and VX as well as the series G toxin recently developed in the United States and possessing intermediate volatility. The foreign press has announced the commenced industrial production of individual types of shells and bombs while the former Supreme Commander-in-Chief of the joint NATO Forces in Europe, Gen Rogers, has announced the conclusion of a development of a plan for deploying binary chemical weapons in Western Europe. The governments of certain countries which are U.S. allies in the bloc are preparing to accept these new means of human destruction for stockpiling on their territory and are thereby covering their own home with the dangerous "American toys" carrying the binary death.

Official Washington circles, in endeavoring to divert attention of the world community from this dangerous venture, have asserted that the Pentagon cannot handle the development and organization of the industrial production of binary weapons, they are playing out scenes of contradictions between the Houses of Congress on building plants to manufacture binary weapons in Pine Bluff, Arkansas, and so forth.

Thus, judging from information in the foreign press, a fundamental restructuring is being concluded in the production of U.S. chemical weapons. The funds allocated to the Pentagon for these purposes are now being turned over to private firms and corporations under the obligation to develop capacity to produce binary chemical weapons (the chemical components of binary synthesis, the containers for these components and other required articles). Up to the present, production capacity has already been established for producing the Bigeye binary bomb loaded with VX and the new G series toxin by the Marquard Company in California. It has also been announced that the Louisiana Artillery Plant which produces the casings of 155-mm shells has begun arming them with DF containers carrying the semiproduct of sarin synthesis.

Thus, step by step the process is being concluded of turning over the development and production of all agents for conducting chemical warfare from the hands of the defense department to the hands of private firms. After turning over the functions of producing chemical weapons to industry, the Pentagon without harming the enormous military potential of the United States, will be able to close down the specialized plants producing toxins as well as substantially reduce the stockpiles of chemical weapons. And all of this can be carried out in the presence of observers from the international inspection bodies.

The changes occurring in the area of the technology and organization of the industrial production for manufacturing chemical weapons in the United States substantially alter the situation on the talks covering the question of a complete ban on chemical weapons. It has become perfectly clear why the American side with such tenacity has defended those sections in the draft chemical convention proposed by it which deny the idea of extending international supervision over the observance of the agreement to private firms, agreeing to such only in terms of the narrowly specialized chemical enterprises under state control.

The Soviet Union and the world community sharply condemn the U.S. plans to produce binary chemical weapons and deploy them in Western Europe and Asia. The realization of these plans would create a threat of turning the given densely-populated regions of the world into potential military theaters of lethal chemical warfare. Here the civilian population would be the main victim of the "binary death."

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Imperialist Intervention in Chad

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[Article, published under the heading "At the Request of Readers," by Lt Col V. Zavadskiy: "Imperialist Intervention in Chad"]

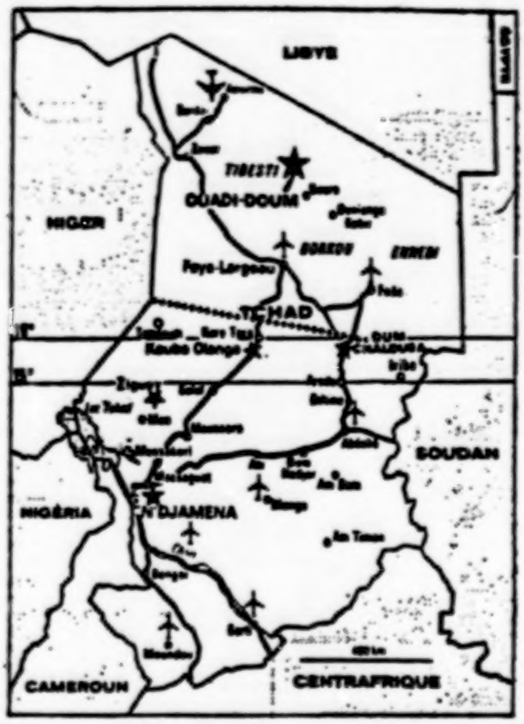
[Text] As a result of the growing intervention by the leading capitalist states of the West in the internal affairs of Chad, the situation concerning this country has again become more acute. The French and U.S. leadership, having chosen one of the poorest nations of the world as an object of their imperialist expansion, for over 20 years has prevented the establishing of national reconciliation and tranquility in it. In artificially fanning religious and tribal differences inherited from the colonial past, imperialism has prevented the extinguishing of the domestic center of tension smoldering here, attempting to use this to strengthen its positions in the area and defeating the progressive forces in it.

Recently the main target of the West's subversive activity in this area of Africa has been Libya whose support in the Chad conflict for one of the opposing groupings, the Transitional Government of National Unity (TGNU), has been actively used by the most reactionary French and American circles for increasing the military pressure on this country. The material and moral support provided by Libya to the anti-imperialist forces in Africa and the Near East, including in Chad, is viewed by Paris and Washington as one of the major obstacles for realizing their neoglobalist plans in the region. Previously, in April 1986, the Reagan Administration, in taking cover behind unsubstantiated assertions on Libyan complicity in so-called "international terrorism," endeavored to alter the generally progressive trend of the nation's foreign policy by the physical elimination of its leadership. However, the bombing strikes by American tactical and carrier-based aircraft against the most important administrative centers of Libya's Mediterranean coast in April 1986, like the economic sanctions introduced against Libya, did not bring success. One of the most important reasons for the failure of the "hard course," in the opinion of foreign specialists, has been the fact that the U.S. administration was unable to fully involve its NATO allies in the anti-Libyan actions in 1986. This is why the White House considers as the main goal of its policy in Central Africa the "internationalization" of the Chadian conflict, that is, the establishing of conditions for a direct armed conflict between France and Libya. It has been announced that a French troop contingent of almost 8,000 men is stationed in immediate proximity to the Libyan frontiers at bases in Chad, the Central African Republic and Gabon.

The prehistory of the situation presently existing in Chad has roots in the past of this country which for a long time was under the unchallenged domination of French colonialists. However, after the granting of independence to Chad in 1960, in political, economic and military terms the young state completely continued to be oriented to the previous colonial power. As a result of the active struggle begun in the 1970s by the national patriotic forces headed by the National Liberation Front of Chad, the pro-French regime of President Malloum was overthrown. On 11 November 1979, in accord with the decisions of the Lagos Conference involving the leaders of 11 military-political groupings (a portion of them had previously belonged to the National Liberation Front which by this time had broken up) and the representatives of Chad's neighboring states, a transitional national unity government was formed headed by G. Oueddei. In 1980, the Minister of Defense of this government H. Habre organized an armed struggle against the TGNU in relying on French aid. Under these conditions, the TGNU which on 16 June 1980 had concluded a treaty of friendship and collaboration with Libya, turned to this country for support. In December 1980, government troops together with Libyan formations introduced into Chad at the request of G. Oueddei, defeated the fighting detachments of H. Habre. However, after the withdrawal of the Libyans and the replacement of them by inter-African security forces at French insistence, at the end of 1981, H. Habre from Sudanese territory resumed military operations against the TGNU. In June 1982, with support of the West and under the conditions of inaction by the inter-African forces, he succeeded in capturing the capital of N'Djamena where in October of the same year from his supporters he organized a government and proclaimed himself head of state.

At the beginning of 1983, supporters of the TGNU from the northern regions of Chad undertook an offensive against N'Djamena and this caused concern in France fearing that it would loose its positions in this country once and for all. Its leadership decided to introduce a French troop contingent into Chad (the operation of ferrying them in was code-named "Manta"). With support of France and Zaire (the latter had also committed its subunits here), H. Habre succeeded in restoring the situation and establishing himself on a larger portion of the nation's territory. Subsequently for a period of a year, some 3,000 French troops and an equal number of Zairian ones occupied positions along the 16th parallel (see the drawing), actually thereby splitting Chad into two zones, the northern where power belonged to the TGNU and southern under the control of the regime of H. Habre.

On 17 August 1984, an agreement was reached between France and Libya on a mutual withdrawal from Chad of the French troops and the Libyan subunits supporting the TGNU. At the same time, the status of the 16th parallel was recognized as the boundary between the opposing sides.



In February 1986, after the resumption of clashes between the Chadian groupings, the French made a new military invasion in Chad. As a total in the course of Operation Epervier (this was the name given to the next action by Paris), up to 2,000 men were moved into the nation from the French Rapid Deployment forces reinforced by Jaguar and Mirage-F.1 fighter bombers and Advanced Hawk and Crotale antiaircraft guided missile batteries.*

French military intervention into Chad was fully supported by the U.S. administration which by that time had substantially increased the amount of military economic aid to the Habre regime, provoking it to decisive actions to "liberate" the north of the nation from its political opponents and the mythical Libyan military presence. By coordinated plans of Washington and Paris, assistance to N'Djamena was to be increased in modernizing the Chadian armed forces which had started in 1982.

Judging from information in the foreign press, Chad received a significant amount of additional American and French military advisors (by the end of 1986, their number had reached, respectively, 500 and 450 men), and there had been an increase in the amount of gratis deliveries to the nation of Western weapons, ammunition, transport and logistic supplies. In 1986, the process of reorganizing the paramilitary detachments into regular units and subunits was actually complete (the total size of the armed forces was around 15,000 men). Due to the shortage of trained officer personnel in the newly created bodies of the superior military command, that is, the Ministry of Defense and the Main Staff of the Armed Forces, key positions in them were held by French servicemen.

Training for the army personnel of the Habre regime was also provided using Zairian and Israeli instructors on the territory of Zaire while officer personnel was trained in France and certain African countries. As is known, at the end of 1986, the organized and trained subunits of the Chadian battalions returned from Zaire to Chad and they comprised the backbone of the ground forces of the N'Djamena armed forces. As the foreign press has announced, their effective strength included the presidential guard battalion, 3 infantry battalions and 1 armored battalion, 16 separate companies, an intelligence squadron, 2 artillery batteries, 3 signals companies as well as rear support subunits. These units were armed with ECR-90, AML-60 and -90 armored vehicles (a total of around 50), 105- and 76-mm field artillery guns, mortars of 120- and 81-mm caliber antitank artillery weapons, Milan antitank guided missiles, antiaircraft artillery guns of 20- and 30-mm caliber as well as the Red Eye antiaircraft missiles.

The aircraft fleet of the Air Force (with around 20 aircraft and over 200 personnel) was added to with 3 Hercules C-130 military transports transferred to H. Habre by the Pentagon as well as 15 Alouette and Puma helicopters.

At the end of 1986, H. Habre, having decided to take advantage of the differences in the leadership of the TGNU which had led to the replacement of G. Oueddei in the post of government chairman by A. Oumar (November 1986), sharply increased military preparations. Abetted by the American administration which had granted his regime a total of $15 million in emergency military aid, H. Habre initiated combat operations to the north of the 16th parallel, where he succeeded in capturing the important population point of Fad. However, further advance of the enemy was stopped by detachments of the TGNU. Libya, considering the ever-growing danger to its southern frontiers from the imperialist forces and their supporters as well as remaining faithful to its obligations stemming from the treaty of friendship and collaboration, was forced in response to this to increase the amount of military economic aid to the TGNU.

Under these conditions France and the United States, fearing a possible change in the course of the fighting in favor of the opposition, resorted to extreme measures. Thus, on 7 January 1987, French combat aviation struck the airfield of Ouadi-Doum in the north of Chad. Up to an additional 1,000 French servicemen were quickly moved from the Central African Republic and Djibouti into the areas of Abeche and Biltine. Moreover, recently the grouping of French combat aviation in the region has been significantly reinforced. Stationed at air bases in N'Djamena (Chad), Bouar and Bangui (Central African

Republic) and Libreville (Gabon) are up to two squadrons of Jaguar and Mirage fighter bombers (over 30 combat aircraft), several reconnaissance planes (Mirage-F.1C and Mirage-3RD) Atlantic base patrol aircraft as well as up to 10 KC-135 tanker aircraft and C-160 Transall military transports. The French government has taken a decision to increase the contingent of its troops by another 1,000 men in the event of a deterioration in the situation in the combat area. At the same time, the U.S. Administration over 3 months delivered the N'Djamena regime weapons and supplies valued at $15 million and in addition plans to turn over another $10 million worth of new weapons.

In constantly stating that the French Armed Forces in Chad do not intend to cross the "red line" (the 16th parallel), France all the same has taken an evermore active position in this country, balancing on the brink of an outright confrontation with the TGNU and Libya which supports it. France has provided weapons and military equipment valued at over $40 million.

As a whole, as foreign specialists feel, the scale of imperialist intervention into Chad has shown a tendency to widen further and this is confirmed by the ever-greater involvement of France, the United States and certain other countries in the conflict. In this context all the more urgent is the appeal of a number of African states supported by Libya to put an end to the foreign military intervention and provide a solution to the Chadian problem by peaceful means within the Organization of African Unity by talks between the hostile groupings. However, the main impediment on the path to realizing the plans for a peaceful settlement remain the reactionary circles of the West who intend to realize their aggressive plans in Central Africa by any means.

Footnote

* For more details on the French Rapid Deployment Forces, see: *Zarubezhnoye Voyennoye Obozreniye*, No 4, 1987, pp 7-12. The Editors.

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Noise-Immune Radio Communications Equipment

18010004d Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 7, Jul 87 (signed to press 6 Jul 87) pp 16-20

[Article by Capt 1st Rank, S. Kovalenko, candidate of technical sciences; Capt 1st Rank V. Chashchin, Lt Col (Res) Yu. Ivanov: "Noise-Immune Radio Communications Equipment]

[Text] In a modern war, foreign military specialists emphasize, the problem of increasing the stability of troop command assumes particular timeliness. In terms of the radio communications systems, this is manifested in a desire to ensure effective functioning of their elements under the conditions of radioelectronic suppression (RES).

One of the ways for solving the problem of protecting radio communications against intentional jamming is the development of equipment which would operate with a sufficiently rapid system of frequency hopping (FH) following a pseudorandom law in a range from several hundred kilohertz (for the SW band) to scores and hundreds of megahertz (USW). This equipment has begun to be widely introduced into the armed forces of the main NATO countries and a number of other states.

In the opinion of foreign experts, FH systems protect radio lines against spot jamming and also substantially impede the interception of radio messages and range finding of the radio emission sources, since the transition from frequency to frequency is carried out according to a law set by a coder and the duration of sending on each frequency can be less than the response time of the enemy radio reconnaissance and jamming equipment.

As a result of work commenced in the 1970s, by 1980 they had developed the first models of meter-band FH radios such as the Jaguar-V (Great Britain) and SINCGARS-V (United States), while at the beginning of the 1980s France developed the TRC950 radio. Up to the present this method has been realized in decameter- and decimeter-band radios. The Western press has announced that more than 30 types of radios have been developed or modernized employing the frequency hopping.

Along with the tactical communications equipment, foreign firms are developing equipment employing the FH method or long-range SW radio communications, for example, the ship SW radio model 7680 of the Litton Amecom firm. The IT&T firm which has developed the SINCGARS-V equipment under a contract with the U.S. Air Force is developing a dependable and jam-proof strategic long-range communication system of the SW and USW bands. It will provide vertical-inclined probing of the ionosphere and automatic choice of the optimum operating frequencies. It is designed to work in radio grids and radio links under telephone, printing and data transmission modes (at a rate of 2.4 kilobytes per second).

In 1985, Rockwell Collins began to complete the development of a unified communications system for American Navy ships. It is expected that its first model will be installed in 1987 on the antimissile destroyer DDG51 "Orly Bjork." With positive results from the testing of this system, it is also to be installed on the antimissile cruisers of the "Ticonderoga" class as well as new aircraft carriers and submarines of the SSN21 class.

The main specifications of certain FH radios are given in the table. The foreign press has given the following characteristic features in the development of tactical communications systems with FH employing a pseudo-random law.

Systems approach to designing. The firms developing equipment with FH (Marconi, Racal, Plessey and others) have realized a comprehensive approach to designing and this includes: providing high communications resistance to jamming against RES equipment and impeding access to information by employing the FH mode (combined with other methods) and cryptoprotective (scrambling) equipment; the elaboration of an entire range of equipment included in the radio link on a common design and production base; the modular designing of the equipment making it possible out of a limited number of units (modules) to develop a broad range of radios from the simplest which are analogs of modern equipment (but with improved weight and size specifications) up to complicated communications systems; widening the functional capabilities of the equipment by working out new or modernizing existing units and modules (for example, incorporating in the radios jamming compensation units); providing compatibility with existing equipment for cooperating with units and subunits having an old fleet of equipment as well as electromagnetic compatibility in networks employing the frequency hopping mode.

In the opinion of Western specialists, such an approach to designing has made it possible for the Marconi firm up to now to develop the Scimitar family of radios in different versions for use (portable and for vehicles) and operating in the decameter and meter wave band and on their basis, the Macaira radio for small ships. The Racal firm, on the basis of the Jaguar-V radio, has developed two modifications of it, the Jaguar-H (the SW band) and the Jaguar-U (decimeter).

Increasing resistance to jamming. One of the first FH radios, the Jaguar-V, protection against RES was provided by the fact that in the frequency hopping cycle of 150-200 seconds, transmission was carried out in a band of 6.4 Mhz employing a selection of 256 frequencies. In the opinion of foreign specialists, the employment of such conditions, in comparison with operating on fixed frequencies, provided a gain in resistance to jamming of 24 decibels in the event of setting up broad-band jamming and 80 decibels with single-frequency narrow-band jamming. However, at present it is considered insufficient to employ just a portion of the operating frequencies of the band or the FH mode. For this reason in the USW radios of subsequent models, there is the possibility of frequency hopping in the entire operating band. In this instance for the meter wave band, the number of frequencies employable in the FH mode increases to 2,320 and with broad-band jamming this provides an additional gain of approximately 10 decibels in comparison with the Jaguar-V radio.

In the SW band, the range of frequencies employable in the FH mode for transmitting information in the Jaguar-H radio is 400 Khz. But in the Scimitar-H radio with FH, a broader range of frequencies is employed due to the employment of a high-speed automatic tuning unit. The necessity of widening the band in which tuning is provided has led to the development for tactical communications of broad-band antennas which have become a component part of a number of radios having frequency hopping.

The FH method is one of the most effective methods of protecting against intentional jamming, however in the arsenal of devices to combat RES, there are also other methods making it possible under certain conditions to increase the resistance to jamming in the radio links. These are being introduced into the new tactical communications systems along with the FH mode.

Among these is primarily super high-speed (SHS) transmission whereby the information is transmitted in short bursts at an increased speed. For example, there is a SHS mode in the System 4000 radios (the Plessey firm) and the SHC 200 (Siemens) and in the latter the duration of the signal is 0.23 seconds.

A rather effective method for combating intentional jamming is spatial selection based on the use of simple phased arrays. This has been developed by the Plessey firm in a jamming-defense device designed for compatible work with a meter-band radio employing two antennas placed 1.5 m apart. It has been asserted that the attenuation of the noise signal can reach 40 decibels. The same firm has proposed using similar devices of the SW and USW bands in the tactical communications radio System 4000 developed by it.

Cryptodefense. In the tactical communications equipment with FH, great attention has been given to maintaining the secrecy of the transmitted information and this has been achieved by employing cryptodefense devices in the radios. These should, in the first place, ensure the secrecy of the calls and messages and, secondly, prevent the enemy on the basis of the intercepted transmissions to discover the order of changing operating frequencies. The cryptodefense units are made as individual functional units built into the radio or connected to the radios by external plugs. In certain instances the FH cryptodefense devices may be absent or combined with the data scrambler.

A characteristic feature of certain radios is the possibility of changing the FH keys and programs by feeding in new data from external portable devices which are connected to the radios for the time required to read the data.

Compatibility. In terms of the frequency hopping radios, the concept of compatibility includes the following: the possibility of operating in radio nets with old radios that do not have FH; electromagnetic compatibility (EMC), that is, the preventing of operating in different nets on

Noise-Immune Radio Communications

Name, manufacturing firm, year of output	Frequency range, Mhz / Radiated power, watts	Tuning discreteness, Khz (hz) / Tuning cycle (no. of jumps per second)	Mode of work / Type of modulation	FH range	Purpose
1	2	3	4	5	6
United States					
Model 7680, Litton Systems, 1983	2-30 / 2,000	(100) / 5, 15, 30	Tp / AM SSB; DC / FM	Chosen by operator	Communication of various classes of ships
SINCGARS-V, IT&T, 1985	30-88 / 0.1, 5, 50	25 / ·	Tp, DC / FM	Entire radio band	Communication with relay (there are scramblers)
MP-83 Rockwell Collins, 1984-85	30-88 / 0.5, 5, 50	25 / 100	·	Same	Tactical communications
Great Britain					
Macaira, Marconi	1.6-30 / 100	(100) / 100	Tp, Tg / AM	Entire radio band	Communications for small ships
AD3400, Marconi, 1984-85	30-400 / 15	25 / 150-200	Tp / AM, FM	Same	Ship communications with avn.
Jaguar-H, Racal, 1984-85	1.5-30 / 15, 100	(100) / 10-50	Tp, Tg, DC / AM, FM	400 Khz	Tactical communications of army and avn. subunits
Jaguar-5, Racal, 1980-81	30-88 / 0.02, 3, 50	25 / 150-200	Tp, DC / FM	6.4 Mhz	Same
Jaguar-U, Racal, 1984-85	225-400 / 3, 50	25 / 150-250	Tp, DC / FM	6.4 Mhz	Same
Scimitar H, Marconi, 1985	1.6-30 / 20, 100	(100) / 10-100	Tp / AM SSB; Tg / AM; Pr, DC / FM	Entire radio band	Long and close communications

1	2	3	4	5	6
		Great Britain (continued)			
Scimitar-V, Marconi, 1982-83	30-88 / 0.5, 5, 50	25 / 150-200	Tp, DC / FM	Same	Close communications
System-4000, Plessey, 1985	2-88 / 5, 20, 50, 100	(100), 25 / •	Tp, Pr, SHS, DC / AM, FM	Chosen by operator in shortwave SW band, entire USW band	Tactical communications
		West Germany			
SHX-200, Siemens, 1981	1.5-30 / 20, 100, 400, 1,000	(100) / •	Tp, Tg, DC, SHS / AM, FM	•	Tactical communications of FRG and NATO armed forces
Series 850, Rohde und Schwarz	1.5-30 / 150	• / 2-3	•	3 Mhz	Tactical communications
SEM 172/182/192, Standart Elektrik Lorenz, 1984	30-80 / 4, 50	25 / •	Tp, DC / FM	Entire radio band	Same
		France			
TRC 950, Thomson-CSF, 1984	30-80 / 50	25 / 300-400	Tp, DC / •	Entire radio band	Tactical communications
		Israel			
VHF-88, Tadiran, 1983	30-88 / 0.25, 3.5, 50	25 / •	Tp, DC / FM	Entire radio band	Tactical communications
HF-700, Tadiran, in development	2-30 / 25, 100, 500	(100) / •	Tp, Tg, DC / AM SSB, AM	Same	Same

N o t e. AM--amplitude modulation; FM--frequency modulation; AM SSB--amplitude single sideband modulation; Tp--telephone; Tg-telegraph; DC--digital communication; Tr--printing; SHS--super high speed.

the same frequencies at the same time; minimizing mutual interference in operating several radios located on the same object (motor vehicle, tank, ship) or not far apart; the possibility of joint work with FH radios of various systems in cooperating nets, for example, within the NATO Armed Forces.

Compatibility with the old radios is achieved by incorporating in the FH radios modes employed in the existing radio equipment and by operating on the frequencies of this equipment (for the USW band operating is achieved in radios having a tuning discreteness of 25 and 50 Khz). In such modes the new radios can operate in the absence of organized interference.

In operating several FH radios in different grids each of which has its own independent frequency hopping program, it is possible to have mutual interference in a coinciding of the operating frequencies. However, the probability of such a phenomenon is low. It has been asserted that in using the Jaguar-V radios it is possible to operate simultaneously in 50 nets without mutual interference and in the instance that in each net the transmission will be not more than 25 percent then the number of nets can be increased to 200-300. With numerous operating devices compatibility can be achieved by employing the so-called orthogonal frequency hopping mode where at each moment of time different frequencies are used in the different nets. The orthogonal mode, along with the nonorthogonal, has been used, for example, in the Scimitar radios.

EMC in operating FH radios located at one place is provided by the high selectivity of the receiver, by its great dynamic range and spectral purity of the emitted oscillations (for example, in the Jaguar-V radio they have employed a four-circuit preselector and the spectral purity of the output voltage of the transmitter is 185 decibels per hertz) in combination with the orthogonal method, by which it is possible to shift the operating frequencies of the radios to the interval required according to the EMC conditions. According to the data in the foreign press, the observing of these conditions has made it possible to eliminate the interference of two radios of the VHF-88 series located on one means of transport.

The radios developed up to now with frequency hopping have different specifications not making it possible to operate them in common nets. American specialists feel that SINCGARS will remain the basic tactical communications radio for all combat arms of the armed forces until the end of the current century. Certain Western European firms have shown an interest in having the radios developed by them be compatible with this. Thus, specialists from the Plessey firm have stated that their main radio, the System 4000, will be compatible with SINCGARS.

As has been emphasized in the foreign press, the work of developing tactical communications systems employing the frequency hopping method has entered the stage of industrial development and series production of the equipment.

There is a widening area of use for the FH systems as equipment has been developed for the ground forces, aviation and navy; they have developed the frequency bands of 1.5-90, 108-174 and 225-400 Mhz; they have increased up to 500-2,000 watts the power of the SW radio transmitters operating in this mode.

Great attention is being given to the questions of the compatibility of the new equipment with the old radios in operation (in terms of the modes and spectrum of operating frequencies) as well as the electromagnetic compatibility of the FH radios operating in different nets. There is the acute question of standardizing the FH modes employed in the radios which have been developed by different firms to ensure cooperation within NATO.

Virtually all the tactical communications radios specially developed for operating with frequency hopping include devices for cryptodefense and these ensure secret transmission of the information and prevent the enemy from detecting the sequence in the change of operating frequencies.

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Organization of Communications in U.S. Army Divisions

18010004e Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 7, Jul 87 (signed to press 6 Jul 87) pp 21-26

[Article, published under the heading "Ground Troops," by Col G. Andreyev: "The Organization of Communications in U.S. Army Divisions"]

[Text] The Pentagon in its aggressive aspirations has assigned an important role to the army which is to conduct combat operations in the aim of defeating the enemy as well as capturing and holding enemy territory. The basis of the army is the divisions, tactical formations capable of conducting combined-arms combat both independently as well as part of a field force in close cooperation with the other Armed Services.

Under present-day conditions, as has been emphasized in the foreign press, particular attention is being paid to troop command in the battlefield and this has always been and remains one of the essential factors for achieving success in a battle or operation. The more complex the conditions and methods for conducting combat operations the greater the importance gained in the reliability and effectiveness of command. In a future war, in the opinion of American military specialists, success will be gained by the side which possesses not only well armed, combat-ready formations but also by a dependable and stable command and control system

capable of providing the required organization of combat actions as well as firm and continuous troop leadership under any combat conditions.

Structure. The basic means for ensuring control of the troops and weapon systems is communications without which the command and control process is virtually impossible. This is why the questions of organizing and ensuring stable and uninterrupted communications have received serious attention and are being given important significance, particularly at the present stage after the adopting of the new concept of the "airland operation (engagement)."

As has been pointed out in the foreign press, the organization of communications in the divisions is determined chiefly by their purpose, type, by the specifically set battle tasks, by the planned methods of combat, by the terrain conditions in the combat area as well as by the available communications forces. The divisional communications system is a complex group of nets, lines, links, channels and communications equipment of varying purpose and composition and providing the commander with effective, continuous and covert control of the subordinate forces in the course of preparing and conducting combat actions under any conditions. According to American manuals, this should meet the following basic demands: stability, reliability, survivability, unjammability, flexibility, mobility, secrecy and compatibility of the communications equipment comprising it. The meeting of these demands is achieved by employing the appropriate communications equipment, by the rational organization of the necessary communications nets, lines, links and channels from them as well as by the establishing and strict fulfillment of a definite order of their employment.

In the army communications is organized according to the principle of from the top downwards, from left to right, to the supporting and reinforcing to the supported and reinforced. All types of divisions have approximately the same organization of the communications system the basis of which is the radio and radio relay communications equipment. In addition to them, they also employ wire and cable facilities, radio-wire, audio and visual communications as well as messengers. The divisional communications system consists of two components: the command communications system which provides a direct and immediate link between the divisional headquarters bodies and the area communications system organized according to the territorial principle.

The command communications system is the basic, more dependable, battleworthy and mobile. It includes command communications centers set up close or at a certain distance away from the troop command posts served by them and these are interconnected by multichannel radio relay and wire communications lines as well as by single-channel SW and USW radio communications equipment. The center includes, as a rule, a communications center, transceiving centers, a communications channel switchboard, cryptographic and messenger services, an information receiving and disseminating service and a communications monitoring center.

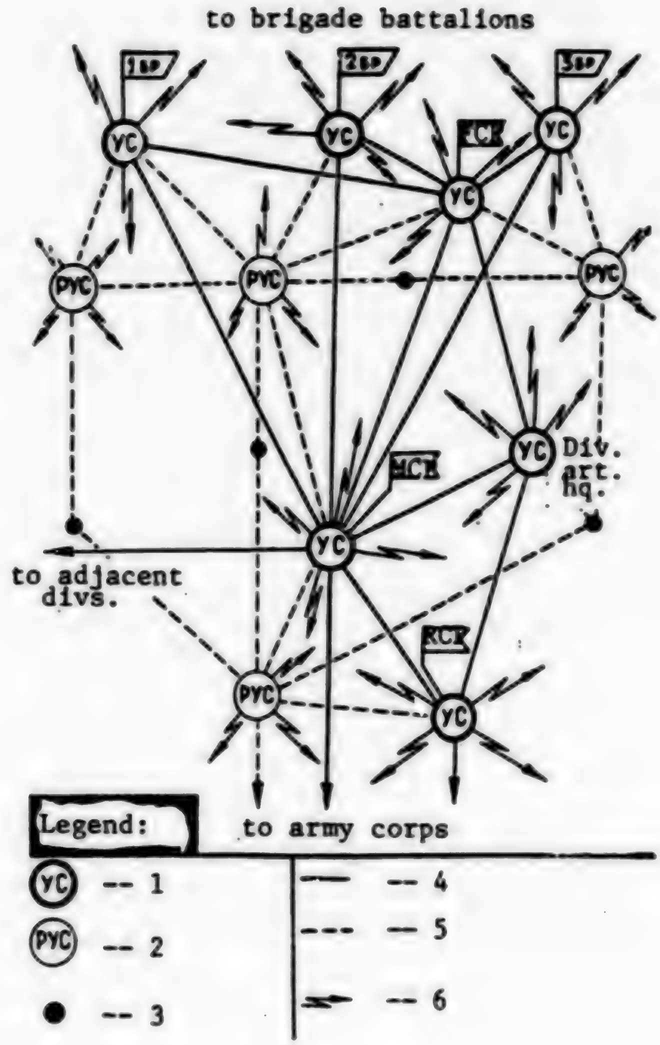
The heart of the system is the communications center of the divisional main command post (MCP) and this is directly linked to the command communications centers of the forward command post (FCP), the rear command post (RCP) as well as with the communications centers of the brigade command posts, the divisional artillery staff, the command posts of the adjacent divisions and the MCP of the army corps. Upon the decision of the divisional commander the command communications system can also include on a permanent or temporary basis the radios of the command posts of the different divisional subunits.

The area communications system is considered to be a component of the area communications system of an army corps of which the division is a part. This is organized with the aid of area communications centers (ACC) interconnected by multichannel radio relay and wire communications lines. A division deploys, as a rule, four area communications centers: three forward ones in the rear areas of the brigades (organized by divisional forces) and one in the rear area of the division (with the forces of the corps communications brigade). Each of these is connected to the nearby centers of the command communications system by multichannel communications lines. The organizing of such a system, in the opinion of American specialists, substantially supplements the command communications system and increases its capabilities, reliability, flexibility and efficiency. It is possible to connect to the ACC nearby subunits and facilities of the division which do not have a sufficient amount of their own communications equipment as well as those which are not part of the command communications system. A typical organization of a division's communications system is given in the drawing.

As has been stated in the foreign press, for organizing communications between the communications centers, both systems most widely employ the radio relay stations of the AN/TRC-113 (intermediate) and AN/TRC-145 (terminal) types. With them it is possible to create multichannel (12- and 24-channel) lines for secure telephone, teletype and facsimile communications. In certain instances for this purpose it is also possible to employ wire cable lines. A division has around 50 radio relay stations of the above-indicated types.

The main form of organizing communications in the army divisions is the special-purpose and general-purpose radio nets. As a rule, the following radio nets are set up for providing leadership and organizing complete support for combat operations in them.

The radio net of the division command is designed for direct leadership over subordinate forces in the course of preparing and conducting combat actions. This operates



Key:
1—Command communications center
2—Area communications center
3—Intermediate radio relay station
4—Multichannel command communications lines (radio relay)
5—Multichannel area communications lines (radio relay, cable)
6—Single-channel SW and USW communications lines

in the USW band providing secure telephone communications. The radio net includes the radios of the following officials and headquarters bodies of the division: the divisional commander (main radio), the operations and intelligence sections of the MCP, the personnel and rear sections of the OCP, the FCP, the divisional artillery, the command posts of the brigades, the intelligence battalion, the army air brigades, the communications battalion, the engineer battalion, the intelligence and ECM battalion, the command of the division's rear services, the antiaircraft battalion and the military policy company. Upon the decision of the divisional commander, the net can also include other users. Here they most widely employ radios of the AN/VRC-46, -47 and -12 types.

The divisional intelligence radio net (USW, secure telephone) includes radios of the AN/VRC-46 type of the intelligence section of the MCP (the main radio), the FCP, the divisional artillery, the command posts of the brigades, the intelligence battalion, the army aviation

brigades, the reconnaissance and ECM battalion, the engineer battalion, the divisional rear services command and the antiaircraft battalion. It is also proposed to create a radio net in the SW band for teletype communications. Its make-up is the same but employs radios of the AN/GRC-142 type.

The radio net of the combat command center (CCC) of the division's MCP (SW, telephone) includes radios of the AN/GRC-106 type of the operations section of the MCP (main radio), the FCP, the brigade command posts and the reconnaissance battalion.

The operations radio net of the division (SW, teletype). This includes the radios of the AN/GRC-142 type of the operations section of the MCP (main radio), the FCP, the divisional artillery, the brigade command posts, the reconnaissance battalion, the army aviation brigade, the engineer battalion, the reconnaissance and ECM battalion as well as the antiaircraft battalion.

The radio net of the division's administrative and rear services (SW, teletype) includes radios of the AN/GRC-142 type of the personnel and rear services section of the MCP (main radio), the divisional artillery, the brigade command posts, the reconnaissance battalion, the forward area communications centers, the divisional rear services command, the antiaircraft battalion and the RCP. Other users can also be connected when necessary to the given net by the forward ACC.

In addition to those examined above, the division sets up radio nets for the weather service, requests for immediate air support, tactical aviation guidance and certain others (at the discretion of the division's commander). The communications centers of the MCP and RCP of the division are part of several radio nets of the superior army corps (the command, operations, intelligence, administrative and rear services), as well as the radio net of the cooperating divisions or formations and units of other Armed Services of the United States and its allies. The total number of radio nets for the above-examined level can reach 30 and more in a division.

Organization of the Subunits. As has been stated in the foreign military press, for organizing communications in a division there is a staff communications battalion as well as communications platoons and sections in the constituent and attached units and subunits.

The communications battalion is designed to provide dependable and stable communications for the commander and the main headquarters bodies of the division with subordinate units and subunits as well as with superior and cooperating staffs. The communications battalion has an identical organization and establishment for all types of divisions as well as the same equipment and weapons. There are certain differences in the number of personnel as well as in the amount and types of communications equipment, transport and other equipment. For example in the mechanized and armored division, the battalion has 783 men, in a light infantry division there are 479 men and in an infantry division 657 men. Each communications battalion consists of a staff and four companies: headquarters, for the communications of the command, the forward communications company and for communications of the rear services command. The battalion commander simultaneously is the divisional chief of communications. He is responsible for the organization and actual use of the entire divisional communications system.

The staff and headquarters company (over 130 men*) are responsible for deploying the division's communications systems, for organizing logistic support of the battalion subunits as well as for troop repair of the equipment and other facilities.

The command communications support company (200 men) provides for the deployment and maintenance of all the communications equipment of the MCP and FCP in the division and primarily the command communications centers using TOE equipment.

The forward communications company (170 men) is designed for deploying and servicing the three forward ACC in the rear areas of the division's brigades as well as for organizing communications at the brigade command posts.

The rear services command communications company (160 men) provides for the deployment and servicing of the command communications center of the RCP in the division and this is usually deployed together with the division's rear services command. Moreover it is entrusted with the tasks of servicing the other communications centers and radios set up in the division's rear area. The company provides a limited amount of troop repairs on communications equipment and other battalion facilities.

American military specialists have pointed out that in addition to the personnel of the communications battalion, in the other subunits of the division there are over 1,000 communications specialists. As a total in a division, depending upon its type, there are, judging from information in the foreign press, 2,750 to 3,195 different types of SW and USW band radios and radio relay stations as well as a significant amount of radio-wire, wire-cable and other communications equipment (the specifications of the main communications equipment of a division are given in the table). With the simultaneous operation of a majority of the communications equipment in all the division's radio nets it is essential to have up to 500 operating frequencies in the different sectors of the wave bands. To avoid or substantially lessen the mutual interference of radio equipment operating in a comparatively limited space (approximately 30 x 40 km), the commanders and staffs of all levels must carefully organize the individual components and the communications system as a whole as well as have a well thought-out procedure for using the elements comprising

it. In addition, it is essential to consider the complicating of the radio electronic situation due to various sources of unintentional electromagnetic radiation (the ignition systems of transport, electric power units and others) as well as enemy operating radio electronic and other emitting equipment.

Specifications of Main Communications Equipment of U.S. Army Division

Name, Type of Radio	Year Introduced	Frequency Band, Mhz	No. of Channels (Fixed Frequencies)	Type of Work*	Transmitter Power, watts	Operating Range, km
AN/TRC-113, radio relay, intermediate	1969	220-400, 395-700, 695-1,000	12, 24	Tp, Pr, Pt	15, 25	50
AN/TRC-145, radio relay, terminal	1968	220-400, 395-700, 695-1,000	12,24	Tp, Pr, Pt	25	50
AN/VRC-12, USW	1961	30-76	(920)	Tp	40	35
AN/VRC-46, USW	1961	30-76	(920)	Tp	40	35
AN/VRC-47, USW	1961	30-76	(920)	Tp	40	35
AN/GRC-106, SW	1963	2-30	(280,000)	Tp, Pr	400	80, 2,000
AN/GRC-142, SW	1966	2-30	(280,000)	Tp, Pr	200-400	80, 2,000

* Tp—telephone, Pr—printing, teletype, Pt—phototelegraph, facsimile.

Views on the Organization of Communications in Combat. The organization of a division's communications and the procedure for using its equipment are covered by the field manuals, technical instructions, permanent and temporary instructions on communications and by the instructions of the commanders and staffs. The basic document is the U.S. Army Field Manual FM 11-50 "Organization of Communications in Infantry, Mechanized, Armored, Air Assault and Airborne Divisions" and this sets out the procedure for organizing communications as a whole as well as in all the units and subunits comprising the division, down to the platoon and squad inclusively. Moreover, it examines the particular features of employing communications equipment. In particular, it is emphasized that the divisional communications system, depending upon the combat task set, the type of combat operations, the situational conditions and the available communications equipment and forces, may undergo certain changes basically on the level of the priority, scale and methods of employing the various equipment and types of communications.

American military specialists feel that on the **offensive** troop command will be provided using chiefly the USW (more rarely, SW) radios operating chiefly in a telephone mode. In individual instances, it will be possible to employ combined radio-wire communications lines. The radio relay communications lines will find limited employment due to the relatively long time required to set them up (30-40 minutes) in changing the positions of the radios. Even less probable is the use of wire-cable communications lines.

On the **defensive**, for organizing command the radio relay and wire communications lines will be most widely employed. Combined radio-wire communications equipment will be intensely employed as this makes it possible to maintain contact between fixed control posts and mobile users. The use of radio communications equipment, particularly that not having secure equipment, is to be strictly limited, as this would be sources of information for enemy radio reconnaissance.

Development Prospects. The presently existing communications system of army divisions, in the estimate of the American command, does not fully meet the demands

made on it. It has been pointed out, in particular, that there is insufficient mobility of the communications equipment, the presence of a significant number of different types and obsolete equipment which does not have devices for securing the transmitted information and protection against jamming, there is an absence of automation and so forth. This discrepancy, in the opinion of foreign specialists, has become particularly apparent after the adopting of the concept of the "airland operation (engagement)" as the practical realization of this places increased demands upon the systems of communications and command of the troops and weapons. First of all, the communications systems, nets and equipment on the tactical level should be as mobile and flexible as the troops and weapons systems supported by them, they should be able to operate dependably and steadily under an exceptionally complex and rapidly changing combat situation and under the conditions of the employment of nuclear weapons and ECM equipment. Moreover, they should provide the possibility of secure, high-speed and automatically switched exchange of large amounts of urgent and important information needed to take immediate decisions. In the aim of organizing close cooperation of the army formations and units in the course of combat it is essential that their communications equipment be connected to the communications equipment of the other armed services of the United States and its allies.

For solving the designated problems, judging from the materials in the foreign press, a range of programs is being implemented to develop more advanced communications systems and equipment. These are above all the Tri-Tac Program which provides for the development and wide introduction into the troops, particularly on the tactical level, of automated switchboards linked by multichannel, high-speed communications lines (including satellite), equipment for connecting different types of communications equipment, more advanced devices for security and protection against organized jamming, multipurpose terminal devices and so forth. Another program called SINCGARS includes the development and production of a new generation of single-channel USW radios which will provide secure and jam-proof communications in a telephone and data transmission mode. These are to be installed on tanks, armored personnel carriers, motor vehicles and helicopters as well as used in a portable model. These will replace the AN/PRC-77 and AN/VRC-12 type radios. The actual conclusion of these programs and the introduction of the new generation communications equipment into the troops are planned, according to the data of the American press, for the end of the 1980s and the beginning of the 1990s.

Footnote

* The number of personnel has been given for an infantry division communications battalion.—Editors.

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Army Aviation of British Armed Forces

18010004f Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 7, Jul 87 (signed to press 6 Jul 87) pp 26-27

[Article by Col S. Anzherskiy: "Army Aviation of British Armed Forces"]

[Text] The English Command, in the aim of further increasing the combat capabilities of the army formations and units, has given an important place to developing army aviation which should play a pronounced role in the course of combat. Army aviation, as an independent combat arms, began developing in 1957 and has recently undergone qualitative changes, particularly with the appearance of helicopters armed with antitank guided missile launchers.

According to the views of English specialists, the army aviation subunits are capable of carrying out a broad range of combat and auxiliary tasks in all types of combat and operation. For example, in the former are fire support for the units and subunits, the destruction of enemy nuclear attack weapons and headquarters bodies, enemy tanks and other targets, the combating of enemy airborne forces, fire support for tactical airborne forces of their own troops, mining the field and so forth. The latter include the conducting of air, engineer, chemical and radiation reconnaissance, supporting troop command, target designation and artillery fire correction, the carrying out of individual missions for electronic countermeasures, the landing (dropping) of airborne forces and reconnaissance-sabotage groups, the delivery of troops, weapons and freight to combat areas, supporting the crossing of water barriers, evacuation of wounded, the carrying out of search and rescue tasks and so forth.

As the foreign press has stated, in the effective strength of army aviation there are 4 army aviation regiments, 15 separate squadrons (including 2 training ones), 11 individual flights as well as a training center in Middle Wollop. As a total there are over 1,700 personnel, over 300 helicopters, including 110 Lynx and 160 Gazelle fire support helicopters.

Overall leadership over army aviation is provided by the army aviation chief of the army staff while direct leadership is provided by the commanders of the appropriate formations and units. There is an army air section on the army staff for administrative leadership.

The main portion of the army aviation forces (approximately 120 Lynx and Gazelle helicopters) is in the I Army Corps stationed in West Germany; there are 3 army air regiments (1 each in armored divisions) and a separate squadron of Gazelle helicopters (12 units). In

wartime their number can be increased by a move from British territory, while the total number of the main types of helicopters can be brought to 270 units. In the interests of the corps they also employ the Puma troop carrier helicopters comprising subunits under the command of the Royal Air Force in West Germany. One army air regiment, the separate squadrons and flights are also part of the army on British territory, in West Berlin, on the Island of Cyprus and the Falkland (Malvinas) Islands, in Hong Kong, Brunei and Belize.

In the foreign military press it has been pointed out that the regiment is the main tactical element of army aviation. It includes a staff and headquarters squadron, two antitank squadrons (each with 12 Lynx helicopters with Tow ATGM [antitank guided missile], a reconnaissance squadron (12 Gazelle helicopters) and an engineer and technical support subunit. As a total, a regiment has 24 Lynx helicopters, 12 Gazelle helicopters and up to 60 different types of motor vehicles. The number of personnel is around 340 men of which over 40 are officers.

Foreign specialists feel that the effectiveness of employing army aviation to a significant degree is determined by the effective command of its forces, by the organizing of cooperation with tank and motorized infantry units, artillery, air defense and tactical aviation, as well as by the correct choice of tactics. Thus, the TOE subunits of a division must be positioned in their combat formations on the axes of the most probable enemy advance, particularly for the enemy tank groupings, but no closer than 10 km from the forward edge. In these instances the army air regiment of a division, depending upon the situation and the nature of the tasks to be carried out, can operate at full strength or squadron-by-squadron as well as by flights. In certain instances it can be employed as the corps antitank reserve. It has been recommended that the subunits of antitank helicopters be assigned battle positions (camouflaged landing pads, in forest glades, in terrain declivities and so forth) which would provide effective fire at maximum range. For reducing losses from enemy antiaircraft weapons and for achieving a surprise attack, it is advisable to make flights at low and maximum-low altitudes with terrain following as well as widely employ various tactical procedures, ECM devices and camouflage.

The flight and technical personnel of army aviation is trained in a training center. The full training program for pilots is designed for 12 months with an obligatory flying time of around 240 hours. Pilots who have at least 1 year of actual flight experience in army aviation are permitted to participate in the retraining for piloting Lynx helicopters with the Tow ATGM. Retraining is planned for 8 weeks with 40 hours of accrued flight time. The army aviation technical personnel undergoes training depending upon the chosen specialty over a period of 2-4 months.

The long-range plans for the development of army aviation envisage a further modernization of the existing helicopter fleet, a rise in the combat effectiveness of the weapons and equipping with modern types of radio electronic and laser equipment. In particular, the English command intends in the future to pay significant attention to developing new antitank helicopters as well as improving the existing ones. Judging from announcements in the Western press, at the present they are concluding testing on the Lynx-3 combat helicopter on which they plan to employ eight ATGM (Hellfire, Tow or Hot) as the main weapon. At the same time, together with Italian, Spanish and Dutch firms, they are planning to develop a new antitank helicopter which should be in service in army aviation in the mid-1990s.

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IFV, APC of Foreign Armies

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[Article by Col Ye. Viktorov: "APC and IFV of Foreign Armies"]

[Text] In the first half of the 1970s, in the armies of the capitalist countries, there appeared the infantry combat vehicle (IFV) for increasing the combat capability of the infantry when it was fighting independently and particularly in cooperation with tanks. In the opinion of foreign specialists, the IFV possesses high maneuverability, sufficiently great fire power and good armor protection. In moving in the battle formations with tanks, the infantry on the IFV helps them detect and destroy enemy antitank weapons, light armored vehicles, helicopters and personnel. With the infantry fighting dismounted, the IFV provides fire support for it. The designs of the IFV ensure the possibility of convenient and covered dismounting or mounting of the assault force. At present, the IFV are used in the armies of the main NATO countries and are beginning to appear in the ground troops of other capitalist states. The specifications of the IFV in foreign armies are given in Table 1.

The United States, since 1981, has serially produced and introduced the M2 Bradley IFV (with a total of around 3,600 units to be delivered). The layout of the vehicle includes the forward placement of the engine and transmission compartment. Ahead and along the sides of the hull they have employed spaced composite armor (steel—aluminum) with the filling of the interior space between the sheets with polyurethane foam. The front of the hull has been reinforced with a wash plate. The undercarriage is protected by hinged side screens. The bottom of the hull has been reinforced with steel plate. From the announcements in the foreign press, the front armor of the vehicle cannot be pierced by 25-mm shells while the sides and stern resist large-caliber bullets. In the sides and stern there are two fire slits for firing from 5.56-mm assault rifles. In the armored turret, where the

Таблица 1

ТАКТИКО-ТЕХНИЧЕСКИЕ ХАРАКТЕРИСТИКИ БМП ИНОСТРАННЫХ АРМИЙ

1) Наименование образца (страна-разработчица, год принятия на вооружение)	2) Боевая масса, т	3) Экипаж / боевой расчет, человек	4) Габариты, м: высота / длина x ширина	5) Калибр оружия, мм: пушки / пулеметов	6) Мощность двигателя, л. с.	7) Максимальная скорость, км/ч / запас хода, км
M2 Bradley (USA, 81)	22.6	3/7	2.9 / 6.45 x 3.2	25' / 1 x 7.62	500	66 / 480
Marder (FRG, 71)	28.2	3/7	2.8 / 6.8 x 3.2	20' / 2 x 7.62	600	75 / 500
MCV-80 Warrior (GB, 85)	24	3/7	2.7 / 6.3 x 3	30 / 1 x 7.62	550	75 / 500
AMX-10P (France, 73)	13.8	3/8	2.6 / 5.8 x 2.8	20 / 1 x 7.62	280	65 / 600
VCC-80 (Italy, exp.)	19	3/6	2.8 / 6.7 x 2.98	25 / 2 x 7.62	480	70 / 600
YPR-765 (Neth., 77)	13.7	3/7	2.79 / 5.3 x 2.8	25 / 1 x 7.62	265	60 / 490
KIFV (S. Korea, 84)	12.9	3/7	2.5 / 5.5 x 2.8	— / 1 x 12.7 и 1 x 7.62	280	74 / 480
VCTP (Argenting, FRG, 79)	27.5	2/10	2.45 / 6.79 x 3.28	20 / 2 x 7.62	720	75 / 570

TABLE 1 Specifications of Foreign Army IFV

1) Name of model (developing country, year of introduction)
2) Combat weight, ton
3) Crew/troop detail, men
4) Over-all dimensions, meters: height/length x width
5) Caliber of guns, mm; cannon/machine guns
6) Engine power, hp
7) Maximum speed, km/hr; range, km

commander and the gunner are located, there is a 25-mm automatic cannon stabilized in two sighting planes and a 7.62-mm machine gun has been coupled to this. For combating tanks on the turret they have mounted a launcher of the Tow ATGM (with two guides). The unit of fire is 7 missiles. In modernization the launcher was also adapted for firing the Tow-2 ATGM with increased armor-piercing capability. The missiles are reloaded through a hatch located behind the turret.

The gunner has a combined daytime and night (television) sight with a sidepiece from it in front of the commander. For driving in darkness, the driver uses an unilluminated infrared device. In the forward part of the IFV hull there are a diesel engine with a power of 500 hp and a hydromechanical transmission. The suspension is torsion-bar. On the 1st, 2d and 6th road wheels there are hydraulic shock absorbers. The track has been assembled from steel track with removable rubber pads. The vehicle can cross water obstacles using an individual flotation device in the form of screens descending along the perimeter of the hull for providing additional buoyancy and is driven by the turning of the track (at a speed of 7 km an hour). In the course of operating the M2 Bradley, a number of shortcomings appeared involving chiefly insufficient protection and reliability. A modernization program has been planned to eliminate these.

On the basis of the IFV they have developed and are producing the M3 armored reconnaissance vehicle and the MLRS multilaunch rocket system.

In West Germany, the Bundeswehr has been provided with over 2,100 Marder IFV. The hull of the vehicle has been welded from armored steel plate. It is felt that the front armor provides protection against 20-mm shells. In the rotating two-man turret there is a mounting with a 20-mm cannon and a 7.62-mm machine gun coupled to it. A second machine gun of the same caliber is located on the stern. The unit of fire is 1,250 rounds and 5,000 cartridges. Along the sides of the vehicle there are firing slits for small arms without leaving the vehicle. The commander and the gunner have periscope sights. On the mounting there are smoke grenades as well as an ordinary and infrared searchlight (range of 1,000 and 800 m, respectively).

The motor and transmission compartment of the IFV is located in the front of the hull. The diesel engine and hydromechanical transmission are in a single unit and along with employing quickly removed connections makes it possible to shorten and simplify the servicing and overhaul of the vehicle. The suspension is torsion-bar with telescopic shock absorbers, and the track has rubberized metal hinges. Water obstacles may be crossed

using an individual, removable flotation system (inflatable floats) at a speed of up to 6 km an hour by spinning the track. The IFV is equipped with a filter ventilating unit, a firefighting system and a radio.

At the beginning of the 1980s, West German specialists modernized the Marder IFV in the aim chiefly of increasing their fire power. On the right of the turret they mounted a launcher of the Milan ATGM (unit of fire, 4 missiles). The cannon was provided with a dual loading mechanism making it possible in the course of firing to rapidly change the types of employed ammunition (armor-piercing subcaliber or general-purpose shells). The effectiveness of nighttime operations of the IFV was increased by replacing the gunners illuminated infrared sight with a television one. The combat weight of the modernized version increased to 30 tons while capacity was reduced to 9 men.

On the basis of the Marder IFV, Argentina has developed and delivered to the army the TAM medium tank and the VCTP infantry combat vehicle. The latter differs from the West German model basically in the presence of a more powerful engine and a new two-man armored turret with a 20-mm automatic cannon. The capacity of the vehicle (including crew) is 12 men.

Great Britain since 1988 has been serially producing the MCV-80 Warrior vehicle which has been introduced into the troops for partially replacing the Trojan tracked armored personnel carriers [APC] which have been in service for over 20 years. As has been pointed out in the foreign press, it is characterized by good running qualities and operational reliability as shown in the course of trials for the prototypes. In terms of its layout, it is similar to the American M2 Bradley.

The English vehicle has a welded hull of an aluminum alloy. In the front there is an 8-cylinder diesel engine placed in the same unit with the automatic hydromechanical transmission. On the left is located the command compartment. In the rear of the hull is the troop compartment which can carry 7 fully-equipped infantrymen. Loading and unloading of them are carried out through a double door in the stern of the hull.

The two-man turret is manufactured from armored steel plates between which is a filler. Here they have installed a 30-mm Rarden automatic cannon. The unit of fire includes rounds basically of armor-piercing subcaliber and general-purpose shells. Coupled to the cannon is a 7.62-mm machine gun. The gunner and the commander have combined (day and night) periscopic sights.

The undercarriage of the vehicle has six coupled rubberized road wheels and three supporting ones per side. The suspension is individual torsion-bar. The tracks have rubberized metal hinges with removable rubber pads. The IFV is equipped with a filter ventilating unit and a radio.

Based on the Warrior MCV-80, they are developing a family of different-purpose vehicles, including armored reconnaissance, command-staff, repair-evacuation and engineer, an armored personnel carrier, a self-propelled antiaircraft mount, self-propelled antitank and antiaircraft missile systems and a freight transporter.

The French Army uses the AMX-10P IFV commissioned in 1973. Its hull is manufactured from aluminum alloy plate which protects the crew against bullets and the shrapnel of small-caliber shells. The main weapon of the IFV is a 20-mm automatic cannon mounted on top of the turret and having remote control. Coupled to it is a 7.62-mm machine gun. The cannon feed system is double-belt and this during firing provides a rapid switch from armor-piercing shells to general-purpose. Firing can be carried out both by the gunner and the commander who are in the turret equipped with the corresponding sights. The cannon drives are electric.

In the troop compartment there is room for eight fully-outfitted infantrymen and they can fire small arms through open hatches in the top of the hull and two firing slits in the rear-opening ramp.

The multifuel diesel engine and the hydromechanical transmission are made in a single unit. The suspension is torsion-bar with hydraulic shock absorbers. Movement across water is provided by water jets. The vehicle is equipped with a filter-ventilating unit, unilluminated night vision instruments and a radio.

On the basis of the AMX-10P they have developed an entire family of different-purpose armored vehicles, including command-staff, reconnaissance, medical and repair as well as the self-propelled antitank missile system (with Hot missiles). The given IFV is also in service in the armies of Greece (240 units), Saudi Arabia (350), Qatar (30) and the United Arab Emirates (30).

In Italy, in 1986, the OTO Melara firm developed the first of four experimental models of the VCC-80 infantry combat vehicle and this is to be introduced at the end of the 1980s.

The hull and turret of the Italian IFV are manufactured from aluminum armor with the reinforcing of the front of the hull by additional arming with steel plates. The layout of the vehicle has a forward position of the engine and transmission compartment. The propulsion unit is a 6-cylinder supercharged diesel engine. The suspension of the running gear is torsion-bar. Along the sides of the troop compartment and in the lowering ramp there are firing slits for small-arms fire.

In the two-seat armored turret there is a Erlikon 25-mm KBA-BO2 automatic cannon with a coupled 7.62-mm caliber machine gun. The advanced fire control system will include a laser range finder and television sights. In the experimental model of the IFV, the seat of the gunner

has a periscopic sight while for the commander, in addition to the six glass blocks, there is a periscopic observation sight which can turn by 360 degrees.

In the Dutch Army there are around 1,500 YPR-765 infantry combat vehicles developed by the American firm Food Machinery and Chemical Corporation on the basis of the M113A1 armored personnel carrier. On the IFV they have used spaced armor of the hull and turret. The vehicle is armed with a 25-mm Erlikon KBA-BO2 automatic cannon and a 7.62-mm machine gun mounted in the single-seat armored turret. The unit of fire of the cannon is 324 rounds. The diesel engine and transmission are in the front of the hull. Movement across water (at a speed of 6 km per hour) is provided by turning the tracks.

Work of developing an IFV is also underway in Japan. Like the above-described IFV, its hull will be manufactured from aluminum armor. In the two-seat armored full-rotating turret they plan to install a 35-mm automatic cannon produced by the Swiss Erlikon firm and a coupled 7.62-mm machine gun. Along the sides of the turret there will be ATGM launchers (with a laser guidance system). There are plans to provide the vehicle with an advanced fire control system providing for nighttime combat.

By the mid-1980s, the South Korean Army had received over 100 KIFV vehicles produced in Korea. The design of the IFV widely used assemblies and units of foreign armored vehicles. The enclosed armored hull (externally reminiscent of the hull of the YPR-765) has been manufactured from aluminum armor used for producing the English light armored vehicles. In its front is a West German diesel engine (280 hp) and an English automatic transmission. The capacity of the IFV is 10 men, including 3 crew members. Maximum highway speed is 74 km an hour (amphibious 6 km an hour) and the range is 480 km. Foreign specialists have noted the insufficient fire power of this vehicle since it is armed only with two submachine guns of 12.7- and 7.62-mm caliber.

Sweden has also begun to develop an IFV the hull and turret of which will be manufactured from steel armor. The main weapon is a 40-mm cannon. In the stern they plan to mount a launcher for the RBS-56 Bill antitank missiles. The start of testing for the prototypes of the IFV has been planned for 1988.

As has been pointed out in the foreign press, although the IFV have become one of the important and essential combat weapons of the ground troops, this does not mean that such a traditional infantry transport vehicle as the armored personnel carrier (APC) has lost its importance under present-day conditions. As before, these are widely employed in the armies of the capitalist countries. As a rule, they are lightly armored tracked or wheeled, cross-country vehicles. Equipped in the appropriate manner, the APC are also employed for conducting reconnaissance, for troop security on the march, for patrolling, for towing artillery pieces and mortars, as well as for transporting ammunition and other military cargo. On the basis of them they have developed self-propelled cannons, mortars and antitank missiles, antiaircraft systems, command-staff, medical, transport and repair-evacuation vehicles.

In design terms a majority of the APC has a front location of the engine-transmission compartment in an enclosed armored hull. As weapons they have machine guns of 7.62- or 12.7-mm caliber, with exception of the APC developed in Sweden and South Africa.

In the opinion of Western specialists, a majority of the modern APC has rather high performance. They are amphibious, air-transportable and adapted for parachute landing, they are equipped with night vision instruments, smoke grenade throwers, filter-ventilating units and firefighting equipment. However, as has been pointed out in the foreign press, in terms of their capabilities even the best APC remain primarily means of transport, as the soldiers must dismount for taking an active part in the combat.

The army commands of the capitalist countries, primarily those comprising the NATO bloc, feel it advisable to have both track and wheeled APC in their armies. In comparing the various vehicles, foreign specialists have concluded that the wheeled APC are cheaper to produce, more economic in terms of fuel consumption, and have a greater operating life between repairs and a longer service life, they are less demanding and better adapted for maintenance and logistic support, particularly in terms of spare parts. Considering these indicators and in accord with the "cost effectiveness" criterion, the wheeled vehicles, as is considered abroad, are particularly good in a theater of military operations with a developed road network. Under the given conditions, the merits of their low weight, high speed and maneuverability are apparent.

The tracked armored personnel carriers, in the opinion of Western specialists, are more effective for use off the roads on impassable areas of terrain. This, in particular, was confirmed during the U.S. aggression in Vietnam and in other military conflicts.

The most widely found in the armies of the capitalist states is the American amphibious tracked APC M113 (more than 70,000 units have been produced). On its base they have developed a family of different-purpose vehicles. Recently the APC has undergone several stages of modernization and this consisted chiefly in increasing its mobility and improving protection. Thus, on the last model, the M113A3, they have installed a more powerful engine (275 hp) and a new transmission, while the aluminum armor of the hull has been reinforced with Kevlar material. There are plans to begin the production of this APC during the current year.

1) Наименование образца (страна-разработчица, год принятия на вооружение)	2) Боевая масса, т / экипаж (десант), человек	3) Габариты, м: высота / длина x ширина	4) Вооружение: количество x калибр, мм	5) Мощность двигателя, л. с.	6) Максимальная скорость, км/ч / запас хода, км
tracked					
M113A1 (USA, 64)	11 / 1 (12)	2,2 / 4,8 x 2,7	1 x 12,7	215	68 / 480
Trojan (GB, 63)	15,3 / 2 (10)	2,28 / 5,2 x 2,8	1 x 7,62	240	52 / 480
Spartan (GB, 75)	8,2 / 3 (4)	2,28 / 5,1 x 2,25	1 x 7,62	195	80 / 480
AMX-VC1 (France, 57)	15 / 3 (10)	2,4 / 5,7 x 2,67	1 x 7,62 или 1 x 12,7	250	60 / 350
C13 (Italy, exp.)	14,6 / 3 (9)	2,47 / 5,65 x 2,7	1 x 12,7	300	70 / 500
PBV-302 (Sweden, 64)	13,5 / 2 (10)	2,5 / 5,35 x 2,86	1 x 20	280	65 / 300
73 (Japan, 73)	13,3 / 3 (9)	2,2 / 5,8 x 2,8	1 x 12,7 и 1 x 7,62	300	60 / 300
Cobra (Belgium, exp.)	8,5 / 2 (10)	2,32 / 4,5 x 2,75	1 x 12,7 и 1 x 7,62	190	75 / 600
4K4FA (Austria, 62)	12,5 / 2 (8)	1,65 / 5,4 x 2,5	1 x 12,7	250	60 / 350
wheeled					
M706 Commando (USA, 66)	8,8 / 3 (6)	1,9 / 5,69 x 2,26	1 x 12,7 и 1 x 7,62	200	90 / 800
Saracen (GB, 53)	10 / 2 (10)	2,4 / 5,2 x 2,5	2 x 7,62	160	72 / 400
Saxon (GB, 84)	10,6 / 2 (8)	2,6 / 5,2 x 2,5	1 x 7,62	164	96 / 500
TPz-1 Fuchs (FRG, 79)	16 / 2 (10)	2,3 / 6,76 x 2,98	1 x 7,62	320	87 / [illegible]
VAB (France, 74)	13 / 2 (10)	2 / 5,98 x 2,5	1 x 12,7 или 1 x 7,62	235	90 / 1000
Fiat 6614 (Italy, 79)	8,5 / 2 (8)	2,18 / 5,86 x 2,5	1 x 12,7	160	96 / 700
BMR-600 (Spain, 79)	13,7 / 2 (11)	2,36 / 6,2 x 2,5	1 x 7,62	360	100 / 700
Grizzly (Canada, 79)	10,5 / 3 (6)	2,5 / 5,9 x 2,5	1 x 12,7 и 1 x 7,62	215	100 / 600
YP-408 (Netherlands, 60)	12 / 2 (10)	1,8 / 6,2 x 2,4	1 x 12,7	165	80 / 500
Pandur (Austria, exp.)	11 / 2 (8)	1,8 / 5,69 x 2,5	1 x 12,7	210	105 / 650
Ratel (S. Africa, 78)	18,5 / 4 (7)	2,9 / 7,2 x 2,5	1 x 20 и 2 x 7,62	320	105 / 1000
EE-11 Urutu (Brasil, 74)	14 / 1 (12)	2,7 / 6,1 x 2,65	1 x 12,7	260	105 / 850
VTP-1 Orca (Chile, 85)	13 / 2 (18)	2,3 / 7,3 x 2,5	1 x 7,62 или 1 x 12,7	260	120 / 1200

TABLE 2 Specifications of Foreign Army Armored Personnel Carriers

Key:
1) Name of model (developer country, year of introduction)
2) Combat weight, ton/crew (troops), men
3) Over-all dimensions, m; height/length x width
4) Weapons: number x caliber, mm
5) Engine power, hp
6) Maximum speed, km per hour/range, km

The tracked armored personnel carriers have also been developed and are in service in the armies of Great Britain (Trojan and Spartan), France (AMX-VC1), Japan (60 and 73), Sweden (PBV-302) and Austria (4K 4FA). At the beginning of the 1980s, prototypes were also produced for tracked APC: the English Stormer, the Italian C13 and the Belgian Cobra (with an electric transmission). Work in the given area is also underway in West Germany and Brazil.

As has been pointed out in the foreign press, in terms of the level of development, production and export of wheeled APC, France holds the leading place in the Western countries. The most widely found are the 2- and 3-axle APC produced by the Panhard firm in different models since the end of the 1950s.

At the beginning of the 1970s, the Saviem firm developed a wheeled (4x4 and 6x6) VAB armored personnel carrier. It had an enclosed hull with bulletproof armor and in the front was the command compartment for the commander and driver and in the rear, the troop compartment. For firing from small arms in the sides of the hull there were firing slits. The APC was armed with a machine gun of 12.7- or 7.62-mm caliber.

The engine compartment was located in the middle on the left side of the hull. There was a diesel engine, a hydraulic torque converter and a 6-speed gearbox. Suspension was independent torsion-bar with hydraulic telescopic shock absorbers. The VAB could cross water obstacles amphibiously (without preliminary preparation) at a speed of 7 km an hour, using two water jet propulsion units.

According to information in the foreign press, up to the present they have produced over 3,500 VAB personnel carriers of which around 2,500 (basically with the 4x4 wheel configuration, including special vehicles) delivered to the French Army.

The Bundeswehr is armed with around 1,000 wheeled (6x6) Fuchs TPz-1 armored personnel carriers and special-purpose vehicles developed on the basis of the given APC (command-staff, transport, engineer, radiation and chemical reconnaissance, with Rasit ground reconnaissance radar and ECM equipment).

The main design elements of the APC have been borrowed from the series military vehicles. The armor of the welded hull provides protection against bullets and fragments of artillery shells. In the nose is the command compartment and behind it the engine-transmission while in the middle and aft is the troop compartment. The wheel suspension is on helical springs and hydraulic shock absorbers. Movement and control under amphibious conditions are provided with two hydropropellers located in recesses in the hull stern.

Wheeled APC are also employed in the U.S. Army (M706 Commando), in Great Britain (the Saracen and Saxon), Spain (BMR-600), Canada (Grizzly), the Netherlands (YP-408), Brazil (EE-11 Urutu), Chile (VTR-1 Orca), and South Africa (Ratel). The Italian wheeled (4x4) APC Fiat 6614 is used by police subunits and the Italian Air Force as well as in the armies of Peru, Somali, Tunisia and South Korea. The specifications of foreign army APC are given in Table 2.

The development of APC in the capitalist countries is continuing. In recent years, prototypes have been developed for the tracked APC C-13 (Italy) and Cobra (Belgium), as well as the wheeled (6x6) Pandur (Austria) and AC200 (South Africa). Foreign specialists have pointed out that the Italian C13 APC in terms of armor protection and mobility approaches the level of an IFV. Versions of it have been developed with cannon armament (calibers of 25-, 60- and 90-mm) mounted in a two-seat armored turret. Characteristic of the Belgian Cobra tracked APC is the presence of an electric-type transmission. At present, the work of developing tracked APC is being carried out in Great Britain (RO2002) and West Germany (on the basis of the Puma multipurpose vehicle.

Judging from information in the foreign press, the army commands of the capitalist states, primarily the member nations of the aggressive NATO bloc, in intensifying the arms race, are carrying out extensive measures to develop and arm their armies with new models of IFV and APC and this, as they feel, will make it possible to substantially increase their combat capabilities, particularly in conducting offensive operations.

10272

U.S. Air Force Reserves

18010004h Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 7, Jul 87 (signed to press 6 Jul 87) pp 35-40

[Article, published under the heading "Air Forces," by Col V. Grebeshkov: "U.S. Air Force Reserves"]

[Text] The first part of the article* reviewed the general provisions concerning the U.S. Air Force Reserve and brief information was given on the organization and strength of the National Guard air force. Below, according to data published in the foreign press, we have dealt with questions concerning the Air Force Reserve Command and the course of combat training for both components in the organized air force reserve.

The Air Force Reserve Command in terms of strength and forces holds second place after the National Guard air force in the over-all structure of the U.S. Air Force reserve components. In organizational terms it includes

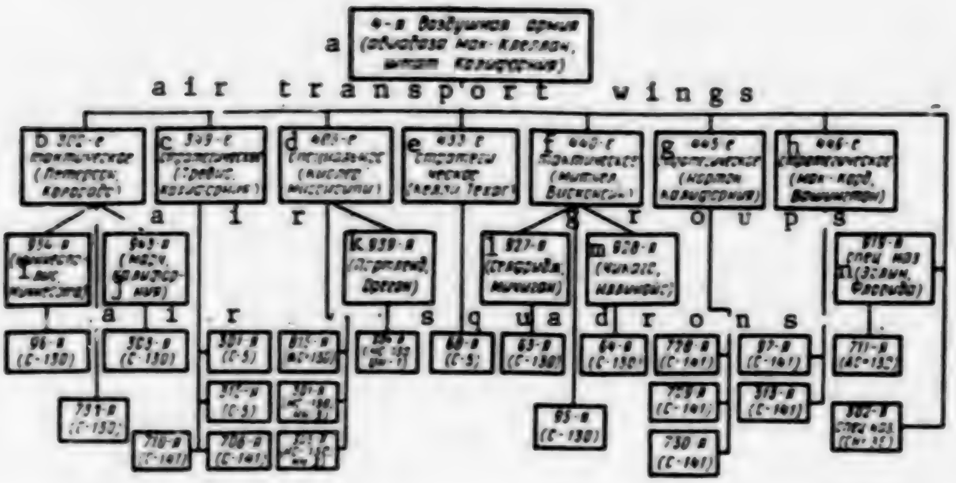

FIG. 1. Organization of 4th Air Army of U.S. Air Force Reserve Command. Its squadrons are stationed at the same air base as the air group (wing) of which they are part with the exception of the 301st Air Squadron which is stationed at Homestead Air Base in Florida, the 305th Air Squadron at Selfridge, Michigan, while the 302d Special-Purpose Squadron is stationed at Luke Air Base, Arizona. The subunits of the 349th, 445th and 446th Air Wings are attached (they do not have their own aircraft) while the 403d Wing is rescue.

Key:
a—4th Air Army (McClellan Air Base, California)
b—302d Tactical (Peterson, Colorado)
c—349th Strategic (Travis, California)
d—403d Special (Keesler, Mississippi)
e—433d Strategic (Kelly, Texas)
f—440th Tactical (Mitchell, Wisconsin)
g—445th Strategic (Norton, California)
h—446th Strategic (McCord, Washington)
i—934th (Minneapolis, Minnesota)
j—943d (March, California)
k—939th (Portland, Oregon)
l—927th (Selfridge, Michigan)
m—928th (Chicago, Illinois)
n—919th Special-Purpose (Eglin, Florida)

Below .n the squadrons, above is the unit number and below the aircraft operated

three air armies (4th, 10th and 14th) comprised of 19 air wings of various air arms. All in all they include 57 air squadrons: 36 TOE (they have their own aircraft), 21 attached (they have only personnel and aircraft of the regular Air Force units are used in their training), as well as 137 ground subunits. As a total in the command's air units and subunits there are around 500 aircraft based at scores of bases and airfields located in the continental United States.

The 4th Air Army (its headquarters is located at McClellan Air Base in California) consists of four air wings, one separate air group and one squadron (armed with their own C-5, C-130, AC-130, WC-130 and NC-130 aircraft and CH-3, HH-3E and UH-1N helicopters), and they also include three attached air wings (two C-5 squadrons and seven C-141 squadrons) the personnel of which for combat training employ regular Air Force aircraft (for more detail on the organization of the 4th Air Army, see Fig. 1). The units and subunits comprising the army are designed basically to be turned over to the 22d Air Army and partially the 23d Air Army of the Military Airlift Command (MAC).

The 10th Air Army (Bergstrom, Texas) includes all the reserve command's tactical aviation (to be turned over to the TAC) and tanker aviation (to be turned over to the SAC). As a total the army has 5 tactical fighter air wings (11 air squadrons armed with F-16, A-10 and F-4 aircraft) and 1 tanker air wing (3 TOE squadrons of KC-135 aircraft and 3 attached squadrons with the personnel of the latter being trained on the KC-10 tanker aircraft in the subunits of the regular Air Force). A more detailed depiction of the 10th Air Army is given in Fig. 2.

The 14th Air Army (Dobbins, Georgia) includes 3 tactical transport air wings (9 air squadrons, C-130 aircraft) and 3 attached strategic transport air wings (2 squadrons trained to operate C-5 aircraft and 6 squadrons for C-141 aircraft) as well as 1 separate attached air group trained for flights on the C-9 medical transport aircraft. All the units and subunits of this army (its organization is shown in Fig. 3) are designed to be turned over to the 21st Air Army of the MAC.

The more detailed strength of the Air Force Reserve Command with indication of the number of squadrons and aircraft in them is shown in the table.

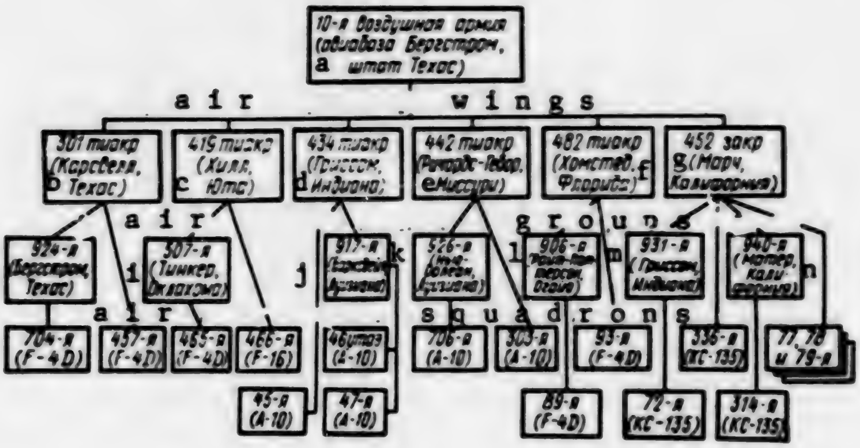

FIG. 2. Organization of 10th Air Army of U.S. Air Force Reserve Command. The 77th (Seymour Johnson Air Base), 78th (Barksdale, Louisiana) and 79th (March, California) Squadrons are attached. Their crews train on the KC-10 tanker aircraft of the regular Air Force.

Key:

a—10th Air Army (Bergstrom Air Base, Texas)
b—301st Tactical Fighter (Carswell, Texas)
c—409th Tactical Fighter (Hill, Utah)
d—434th Tactical Fighter (Grissom, Indiana)
e—442d Tactical Fighter (Richards-Gebaur, Missouri)
f—482d Tactical Fighter (Homestead, Florida)
g—452d Tanker (March, California)
h—924 (Bergstrom, Texas)
i—507 (Tinker, Oklahoma)
j—917 (Barksdale, Louisiana)
k—926 (New Orleans, Louisiana)
l—906 (Wright-Patterson, Ohio)
m—931 (Grissom, Indiana)
n—940 (Mather, California)

Air squadrons are the same as in Fig. 1.

Compsosition of Air Force Reserve Command

Name of Aircraft and Helicopters	Number Crews	Aircraft	Name of Aircraft and Helicopters	Number Crews	Aircraft
Tactical fighters:			Search and rescue aircraft and helicopters:		
F-16	1	16	HC-130	3	15
F-4C and D	5	120	UH-1N	—	12
A-10	5	100	HH-3E	—	8
KC-135 tankers	3	24	WC-130 weather reconnaissance aircraft	1	7
Strategic transports:			Attached*:		
C-5	1	8	C-5	4	—
C-141	1	8	C-141	13	—
			C-9	1	—
C-130 tactical transports	14	143	KC-10	3	—
Special-purpose aircraft and helicopters:					
AC-130 aircraft	1	10	Total	57	487
CH-3E helicopters	1	6			

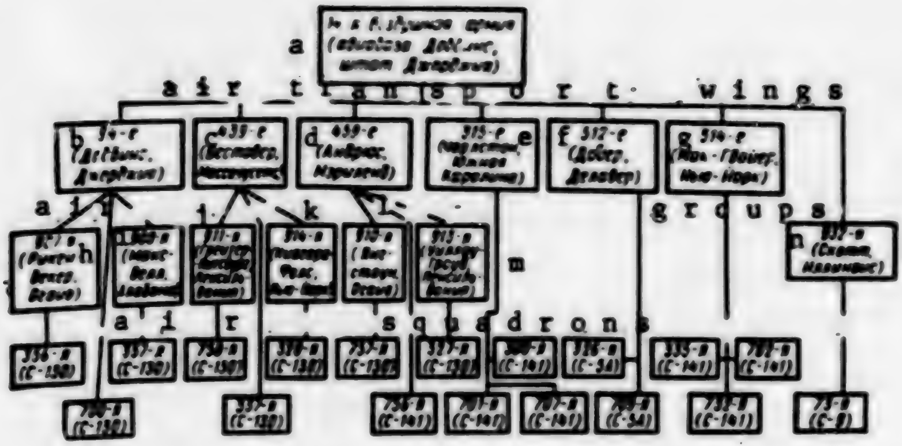

FIG. 3. C ganization of 14th Air Army of U.S. Air Force Reserve Command. 315th, 312th and 314th Air Wings, as well as 932d Medical Transport Air Group are attached.

Key:
a—14th Air Army (Dobbins Air Base, Georgia)
b—94th (Dobbins, Georgia)
439th (Westover, Massachusetts)
d—459th (Andrews, Maryland)
e—315th (Charleston, South Carolina
f—512th (Dover, Delaware)
g—514th (McGuire, New York)
h—907 (Rickenbacker, Ohio)
i—908 (Maxwell, Alabama)
j—911 (Greater Pittsburgh, Pennsylvania)
k—914 (Niagara Falls, New York)
l—910 (Youngstown, Ohio)
m—913 (Willow Grove, Pennsylvania)
n—932 (Scott, Illinois)
The air squadrons are the same as described in Fig. 1.

Composition of Air Force Reserve Command

* Personnel only, for training use regular Air Force aircraft.

The system of attached air wings and squadrons existing in the Air Force Reserve Command the personnel of which is trained on C-5 and C-141 strategic transports and the KC-10 tanker aircraft of the regular Air Force provides an opportunity for the extended and intense employment of these aircraft by assigning up to two reserve flight crews for each aircraft in addition to the two TOE ones. Thus, the system of attached units and subunits ensures the presence of four trained flight crews per aircraft. The demands for ground specialists for extended and intense employment of the strategic transport and tanker aviation subunits under extraordinary conditions (23 hours and more a day) are met using the technical and operational personnel of the attached squadrons.

The Air Force Reserve Command, like the National Guard air force, is continuing organizational and other measures aimed at improving the aircraft fleet and improving the combat capabilities of the units and subunits.

Thus, in 1986, within the Command on the basis of the tactical transport squadrons they established the first two strategic transport squadrons armed with C-5 aircraft (Kelly Air Base, Texas) and C-141 aircraft (Andrews Air Base, Maryland), each with eight aircraft. In October 1987, they plan to rearm one other squadron (Westover Air Base, Massachusetts) switching from C-130 aircraft to C-5.

At the same time a process is underway of replacing the obsolete tactical transports. In particular, they have taken out of service the C-7 aircraft and the first models of the C-130 (A and B modifications) are being replaced by the same aircraft but later models (D, C, E and H).

The capabilities of tactical aviation are rising. All the obsolete F-105 tactical fighters previously part of the Air Force Reserve Command have been taken out of service and replaced by more advanced combat aircraft. The reequipping is being carried out rapidly. Thus, in January 1984, the 419th Tactical Fighter Air Wing which was

based at Hill Air Base and equipped with F-105 aircraft began to retrain for F-16 aircraft and 6 months later it participated in the Patriot Glacier Exercise in Alaska, carrying out the entire range of missions assigned to it. At the same time, there has been a process of replacing the first models of the F-4 aircraft with later models.

The organizational structure of the air units comprising the Air Force Reserve Command is being improved. In particular, in 1987, at Luke Air Base, Arizona, they plan to deconstitute the squadron of special-purpose CH-3E helicopters (6 aircraft) and on its basis establish a tactical fighter squadron equipped with F-16C and D aircraft (24 units).

As has been emphasized in the American military press, military transport aviation plays an important role in supporting the combat operations of the Army, Air Force and Navy. The Pentagon considers this one of the chief elements in achieving the strategic mobility of its military machine and the basic means of airlifting interventionist forces to any region of the world. Moreover, it is given of the following missions: ferrying airborne assault forces, delivering logistic supplies to designated areas, evacuation of sick and wounded and conducting search-rescue and special operations.

In the components of the organized Air Force reserve a significant portion of the forces is made up of military air transport subunits. However, in the opinion of the U.S. military leadership, the forces available in the regular Air Force and its organized reserve are not sufficient for successfully carrying out all the missions confronting the military air transport. For this reason, in the United States there is a reserve of civil aviation. On the basis of the existing legislation of the U.S. Congress, each year at the request of the Pentagon, a quantitative and qualitative reserve of the MAC is set for the civilian airlines of the nation. Thus, in the current fiscal year, 320 planes have been assigned to this reserve, including 294 long-range aircraft and with 67 of these cargo aircraft (Boeing 707, Boeing 747, DC-8 and DC-10), 227 passenger planes (Boeing 747, L-1011, DC-8 and DC-10) as well as 26 short-range aircraft (Boeing 727 and DC-9). Three stages of mobilizational readiness have been set for these aircraft and their crews and in accord with these their quantity and the date for shifting to military status have been set.

Operational and combat training. According to the views of the U.S. Air Force Command, a high level of combat and mobilizational readiness for the units and subunits in the organized Air Force Reserve and professional preparedness of its personnel are provided by the constant participation of these units and subunits in the diverse exercises of the U.S. Armed Forces and Air Force along with the regular forces. Just the tactical air subunits of the Air Force Reserve Command in 1986 participated in more than 36 different exercises such as Voland Panther, Solid Shield, Red Flag, Green Flag, Maple Flag and others, clocking around 48,000 hours during this.

In the course of the exercises the air squadrons work out the questions of carrying out combat missions in cooperation with the ground forces under conditions as close as possible to actual combat. This was particularly apparent in exercises of the Red Flag type which were conducted at the specially equipped Nellis Range in Nevada and provide an opportunity for the flight crews to undergo practical training in employing the aircraft weapons systems in simulating active enemy counteractions. In the estimate of the U.S. Air Force Command, the participation of reservists in such exercises significantly increases the level of their combat skill. In line with this there are plans to involve each subunit of the organized Air Force Reserve in Red Flag exercises at least once every 2 or 3 years (once every 18 months in the regular Air Force).

According to information in the foreign press, the tactical air subunits of the organized reserve train systematically in flights across the Atlantic and Pacific with midair refueling in the aim of working out the questions of deployment at the forward air bases of Europe, the Far East and other regions.

One of the largest such exercise was the Exercise Coronet Buffalo-85 in the course of which two squadrons of A-70 attack aircraft (36 planes) made a simultaneous flight from the continental United States (South Dakota and Iowa) to Great Britain. The maintenance personnel of these subunits (350 men) was delivered there by transport aircraft of the U.S. Air Force. After airlifting, these subunits participated in exercises together with the Royal Air Force.

Usually such flights were made in groups of two or three flights (8-12 aircraft). Thus, in 1986, under the Checkered Program 12 A-10 attack planes from the 434th Tactical Fighter Air Wing (Grissom Air Base, Indiana) made a flight to the Villafranca Air Base (Italy), where for a period of 2 weeks they worked on the question of mastering the theater of operations while 12 F-16 fighters from Hill Air Base (419th Air Wing) flew for the same purposes to Skrodstrup, Denmark.

Not only the aviation but also the ground subunits of the organized reserve are involved in the exercises. In particular, in 1986, more than 75,000 reservists of the U.S. Air Force were involved in such major exercises as Brim Frost (Alaska), Team Spirit (South Korea), Candle Liberty (Panama). The National Guard air forces subunits participated in the exercises Reforger (Western Europe), Bright Star (Egypt) and others.

In the course of these and other exercises, the strategic and tactical air transport subunits of the organized Air Force Reserve carried out tasks on a global scale along with the regular MAC subunits. During the period of a year, they flew more than 135,000 hours and transported

almost 250,000 tons of freight and over 520,000 personnel. Here the crews alone of one attached squadron on the C-9 medical transport aircraft flew 16,347 hours and transported around 52,000 "sick and wounded."

As has been emphasized in the foreign press, the high level of readiness in the reservists ensures their rapid mobilizing and combat employment. Thus, during the U.S. aggression in Grenada, subunits of the Air Force Reserve Command were activated for the first time from the military transport aviation. Here on C-5 and C-141 aircraft they made 20 sorties, and 4 on C-130. Their midair fueling was carried out by KC-135 tankers from the reserve subunits (11 sorties). As a total during this invasion the airplanes from the organized Air Force Reserve made 35 sorties and flew 329 hours.

In the course of the U.S. aggression against Libya in the spring of 1986, the F-111 fighter bombers of the attack group were refueled in midair by tankers including from the Air Force Reserve subunits.

The U.S. Air Force Command has assigned a significant role to the reserve components in the general range of tasks carried out by the Air Force and views them as a powerful means for reinforcing the units and formations of the regular Air Force which are an important component in the Pentagon's military machine in realizing the aggressive plans of American imperialism.

Footnote

* For the beginning see: *Zarubezhnoye voyennoye obozreniye*, No 6, 1987, pp 31-36. Editors.

10272

Reducing Influence of G-Loads on Pilot

18010004i Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 7, Jul 87 (signed to press 6 Jul 87) pp 41-42

[Article by Col L. Monin: "Reducing the Effect of G-Loads on the Pilot"]

[Text] Judging from information in the foreign press, in recent years the Western aviation medics have been evermore concerned by the reduced work capacity in pilots, even to the point of losing consciousness from acceleration which they experience during flights on modern fighters. They see the reason for this in the fact that modern combat aircraft are capable of executing movements which exceed the normal tolerances of the human organism.

American military experts have concluded that a portion of the aviation disasters which occurred in the U.S. Air Force in 1983-1984 occurred precisely due to the loss of consciousness by pilots with the rapid onset of high g-loads. For example, for this reason four F-16 fighters crashed. It is assumed that the loss of the first two test models of the F-20 Tigershark tactical fighter was caused by the same.

In the opinion of foreign specialists, due to the reduced static stability, to the high weight-to-thrust ratio and to the use of effective electrodistationary [fly-by-wire] control systems, modern combat aircraft and in particular such as the F-15, F-16 and Mirage-2000 are significantly more maneuverable than their predecessors. In flying them g-loads may occur of up to 9 units and here in a very short time (less than 5 seconds). As a result, all the parts of the pilot's body and his internal organs simultaneously and often suddenly are subjected to very high g-loads. Under such conditions, the natural protective reactions of the organism (for example, an acceleration in the pulse rate or increased frequency of breathing) are delayed. For this reason, a loss of consciousness can occur unexpectedly, that is, without the ordinary "warning symptoms" (in particular, disruptions in the function of the apparatus of vision) and may last up to 30 seconds and this is very dangerous. Thus, a further improvement in the flight qualities of the aircraft has begun to be limited by human physiological capabilities.

Western military specialists feel that to a certain degree the given problem can be solved by incorporating changes in the aircraft design, by utilizing more advanced g-suits as well as by improving the pilot training system. Thus, there are plans to equip the aircraft with new seats with an increased incline of the back. The latter is required for reducing the distance along the vertical between the heart and the brain of the pilot and this somewhat reduces the effect of the g-loads on him. However, as experience shows, such seats also have substantial shortcomings, for example, they limit the pilot's freedom of movement. For this purpose the crews of the French Mirage-2000 aircraft wear light protective helmets which reduce the stress on the cervical vertebra.

In the process of improving the g-suits, foreign designers have endeavored to first of all sharply improve the "response" of the valve for the compressed air supply system to the sections of the suit so as to minimize the gap between the time of occurrence of the g-loads and the inflating of the suit. Thus, the United States for some time has been working on developing a magnetic valve the operating of which is directly linked to the movements of the aircraft's elevator. In a high-altitude g-suit developed in France, a section of the chest is under pressure. Moreover, with the development of g-loads, oxygen is delivered to the breathing mask under a higher pressure. However, the following major drawback of such a suit has been noticed, that is, dressed in it a pilot cannot talk with significant g-loads.

In the opinion of many foreign specialists, the effectiveness of the above-mentioned improvements in the aircraft cockpit equipment and the equipping of the crew

members can be substantially increased by improving the pilot training process. They have put great hopes upon using a centrifuge. Here each pilot must be explained the essence of the problem and demonstrated in practice the limits of his individual capabilities in operating under g-load conditions, he must learn correct breathing and so forth.

Nevertheless, many Western experts doubt that it is possible to confidently recruit pilots using a centrifuge and significantly increase their physiological capabilities for executing flights involving great g-loads. However, it has been possible to establish that short and stocky individuals better tolerate great g-loads than do tall and lean ones.

In addition to the above-mentioned measures, abroad they are conducting other work aimed at solving the problem of g-loads and increasing flight safety. Thus, the United States is examining the possibility of developing an emergency automatic system which, if the pilot loses consciousness, would take over the control of the aircraft during the period that he remains in this state.

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F-16 Fighters in U.S. Air Defense System

18010004j Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 7, Jul 87 (signed to press 6 Jul 87) pp 42-44

[Article by Col I. Karenin: "F-16 Fighters in the U.S. Air Defense System"]

[Text] After protracted debates concerning the search for a new weapon to combat long-range cruise missiles in the airspace of the continental United States, the Pentagon has chosen the F-16A Fighting Falcon fighter. According to announcements in the foreign press, these planes are to be delivered to reequip 11 air defense squadrons in the National Guard air force replacing the considered obsolete F-106A Delta Dart fighter interceptor and the multipurpose F-4C Phantom-2 fighters. The comparative descriptions of the F-106A, F-4C and F-16A aircraft, as compiled from materials in the foreign press, are given in the table.

Specifications of F-106A, F-4C and F-16A Aircraft

Description	Aircraft		
	F-106A	F-4C	F-16A
Crew, men	1	2	1
Weight, kg:			
Maximum take-off	17,350	24,765	16,060
Empty aircraft	10,730	12,700	7,360
Propulsion unit:			
Number of engines x maximum thrust, kg	1x11,120	2x7,700	1x11,300
Speed, km/hr:			
Maximum at great altitude	2,450	2,550	2,145
Cruising	980	925	990
Service ceiling, m	17,400	21,640	18,000
Ferry range, km	2,400	3,700	3,890
Combat range in intercepting air targets, km	925	900	over 900
Length of aircraft, m	15.01	21.56	19.15
Height, m	5.09	6.18	4.96
Wing span, m	9.45	11.67	11.7
Wing area, m^2	27.9	63.8	49.2

Specifications of F-106A, F-4C and F-16A Aircraft

The F-106A Delta Dart all-weather fighter interceptor was developed on the basis of the F-102A Delta Dagger fighter in 1954, and was serially produced in 1956-1960. A total of 257 F-106A aircraft were built and these were introduced only in the American Air Force. The fighter has been designed as a monoplane with triangular mid-wing and a single-fin tail unit without a horizontal stabilizer. The propulsion unit includes one turbojet engine J-75-P-17 of the Pratt and Whitney firm with a maximum static thrust of 11,120 kg. Fuel is carried in two integral wing and fuselage tanks and provision is also made for suspending two drop underwing fuel tanks. Weapons include one built-in six-barrel 20-mm Vulcan cannon and two Falcon short-range, air-to-air missiles located in the fuselage compartment.

The F-4C Phantom-2 fighter was serially produced in 1963-1966. A total of 583 aircraft were produced and 36 of these were purchased for the Spanish Air Force, while the remainder were delivered to the American Air Force. The fighter is a monoplane with a low-set, swept-back wing with a certain positive dihedral, an all-moving stabilizer with a negative dihedral angle and a single fin tail unit. The propulsion unit consists of two turbojet engines J79-GE-15 of the General Electric firm with a maximum afterburning thrust of 7,700 kg each. The fuel (7,570 liters) is located in two wing and six fuselage tanks. In addition, under the fuselage it is possible to suspend a 2,270-liter fuel tank and under the outer wings, two tanks of 1,365 liters each. The main weapon is six medium-range, air-to-air Sparrow guided missiles, four of which are suspended under the fuselage in a semirecessed position and two on underwing pylons.

The F-16A Fighting Falcon fighter has been in series production since 1977. In addition to the U.S. Air Force, it is in service in the air forces of Belgium, Denmark, the

Netherlands, Norway, Israel and a number of other countries. It is a monoplane with a Delta-shaped mid-wing and a single-fin tail unit with turning stabilizer plates. The propulsion unit includes one bypass turbojet engine F100-PW-200 produced by Pratt and Whitney with a maximum afterburner thrust of 11,300 kg. The fuel (over 3,000 liters) is located in wing and five fuselage tanks and there is provision to suspend additional fuel tanks (one under the fuselage and two underwing tanks with a capacity, respectively, of 1,136 and 1,400 liters). The fighter is equipped with a built-in six-barrel, 20-mm Vulcan cannon (unit of fire 515 rounds) and on the tips of the outer wing are air-to-air Sidewinder guided missiles while on the outer and mid-underwing attachments it is possible to carry another up to four missiles of this type.

The Western press has pointed out that in contrast to the serially produced models, the F-16 aircraft selected as air defense fighters (they have been given the name F-16 ADF or air defense fighter), before being delivered to the National Guard air force will be somewhat modernized. In particular, they plan to mount new combined launchers which will make it possible to suspend both the AIM-7 Sparrow guided missiles and the future medium-range AIM-120 (AMRAAM) missiles. In this context they will have to improve the existing AN/APG-66 aircraft radar in order to provide the possibility of employing the given missiles from the fighter. The F-16 ADF is also to be equipped with a AN/ARC-200 radio, equipment of the Mk12 radar identification system, a receiver for the NAVSTAR satellite navigation system and other equipment. In addition, on the aircraft they plan to suspend two additional fuel tanks each with a capacity of 2,270 liters. This will make it possible to have a range without midair refueling of over 1,500 km while carrying two Sidewinder guided missiles and two Sparrow or AIM-120 missiles. All of this, taken together, as the American military specialists feel, will help to increase the combat capability of the F-16 ADF fighter in carrying out its missions of intercepting air targets.

According to information in the foreign press, the first modernized F-16 aircraft will be delivered to the line units of the National Guard air force in the spring of 1988 while the final deliveries of all the 270 fighters planned for retrofitting are expected in the 1990 fiscal year.

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Japanese Space Development

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[Article, published under the heading "At the Request of Readers," by Col N. Gavrilov, candidate of military sciences, and L. Romanenko: "Japan's Space Development"]

[Text] As early as the 1960s, Japan began space development. The first launch of the Osumi satellite with the aid of a Japanese-developed carrier missile occurred in 1970 and the first spacecraft was put into stationary orbit in 1983. From the second half of the 1960s, Japanese industry has developed, manufactured and launched more than 35 different types of space vehicles of which only 3 were put into near-earth space using American carrier missiles. At the same time, the Western press has pointed out that Japanese successes in developing space to a certain degree were determined by its technical policy oriented at U.S. aid. Thus, a majority of the modern carrier rockets was developed in Japan employing American licenses and all its main communications and weather satellites were developed jointly with American firms. In the 1990s, in developing new spacecraft they also intend to employ U.S. technology. It has been stated, for example, that approximately 10 percent of the equipment carried on Japanese spacecraft will be of American production.

Leadership of work in the space area. The main body which determines Japanese policy in this area is the Commission on Space Activities which functions under the prime minister. Direct leadership over the work on a national scale is provided by the National Space Development Agency (NASDA) and the Institute of Space and Astronautical Science (ISAS). For eliminating duplication, the first agency has been entrusted with the tasks of developing applied-purpose spacecraft and the most powerful carrier missiles with liquid-fuel rocket engines, while the second is in charge of the scientific research spacecraft and the solid-fuel rockets. Each of the organizations has its own space missile testing centers and facilities for orbiting satellites.

The Tanegashima Testing Center belongs to the NASDA and is located on Tanegashima Island with coordinates of 30 degrees N lat and 130 degrees E long. The construction of the testing center was carried out in 1966-1975. It is designed to launch various satellites for specific purposes chiefly with the aid of the series N and H carrier rockets. The area of the test range is 8.64 km^2, the sector of the launch azimuth is 23-150 degrees and the range of satellite orbit inclinations is 30-100 degrees. Although according to the plans the range is capable of making 10-14 launches a year, in actual terms it is operated only 2 months a year (February, August). In 1986, here they began to build a launch facility for satellites employing the new H-2 carrier rockets.

According to announcements in the foreign press, at present Japan is reviewing plans for developing a new rocket-space facility on Hokkaido Island.

The Utinoura Test Range (the other name is Kasgoshima) belonging to the ISAS is designed for launching scientific-research satellites weighing up to 700 kg into low, near-earth orbits. At present, for this purpose they are employing the M-3S-2 carrier rockets for this purpose. The construction of the range located on Kyushu

Island with coordinates of 31 degrees N lat and 131.5 degrees E long was carried out in 1962-1967. Here are located two launch facilities and at both the preparation of the carrier rockets for launching is carried out both in the technical area as well as at the launch site. The range area is 0.67 km^2, the sector of the launch azimuths is 23-150 degrees and the range of satellite orbit inclinations is 30-70 degrees. The range is designed for 10-15 launches a year although in fact only one is carried out.

For lofting spacecraft into orbit, Japan has used several types of carrier rockets both of its own development as well as those developed from American licenses. In addition, in the long run there is the possibility of launching certain heavy satellites into a stationary orbit using the Arian carrier rocket belonging to the European Space Agency. Below we give brief descriptions of the Japanese carrier rockets.

The M-3S is a three-stage, solid-fuel missile developed in Japan (launch weight of 48.7 tons, length 23.8 m) and makes it possible to loft a payload of around 300 kg into circular orbit with an altitude of up to 300 km.

The M-3S-2 is a four-stage, solid-fuel carrier rocket (launch weight 61 tons, payload 770 kg) and since 1985 has been employed for launching scientific research satellites.

The N-1 was developed by the Mitsubishi firm under American license on the basis of the Thor-Delta rocket. It is a three-stage carrier rocket (the first two stages are liquid fuel and the third is solid fuel) with a launch weight of 90 tons and a length of 32.6 m. With its help it is possible to loft spacecraft weighing 130 kg into a stationary orbit or 1,200 kg into a circular orbit 250 km high.

The N-2 was developed on the basis of the American Thor-Delta carrier rocket and differs from the previous in a greater length of the first stage fuel tank, increased engine thrust and a larger number of solid-fuel boosters. The launch weight is 134.5 tons, the length is 35.4 m. The carrier rocket makes it possible to loft into stationary orbit a payload weighing 350 kg or 1.6 tons into an orbit 1,000 km high with an inclination of 30 degrees. For the first time in Japan the N-2 has employed an inertial guidance system.

The H-1 is a three-stage rocket with a launch weight of 140 tons and a length of 40 m. A feature of it is the use of a liquid-fuel rocket engine only in the second stage and operating on hydrogen and oxygen. The H-1 rocket makes it possible to loft into stationary orbit a payload of 550 kg or a payload up to 3,000 kg into a low, near-earth orbit.

The H-2 is in the initial development stage and, in the opinion of foreign specialists, may be in service in 1995 (the first and second test launches have been set for 1991 and 1992). This is a two-stage carrier rocket using a liquid-fuel rocket engine operating on hydrogen and oxygen. According to the plans, the launch weight of the H-2 is 255 tons and the length is around 50 m. With its help they plan to loft into stationary orbit payloads weighing up to 2,000 kg or a payload of 7,500 kg into a circular orbit some 1,000 km high and with an inclination of 30 degrees. One of the purposes of the H-2 rocket is to launch a reusable spacecraft which would be a Japanese-developed minishuttle.

The Japanese space program. Space research and its development for applied purposes are being carried out in Japan in accord with a plan worked out in 1983 and running to the year 2000. Judging from information in the Western press, the main aim of the work is to develop advanced technology, to satisfy Japan's requirements for different-purpose satellite systems, to increase national prestige and eliminate dependence upon the United States in rocket and satellite construction.

In particular, important significance is being given to developing powerful liquid-fuel carrier rockets, communications and direct TV broadcasting, weather, geodetic and navigation support satellites, as well as satellites for surveying natural resources of the earth and seas. A number of measures has been planned for Japanese participation in certain experiments within the American Space Shuttle Program and in developing a permanent orbiting station. They are studying the development concepts for national aerospace vehicles and an orbiting space station.

Within the scientific research section of the Japanese space program they intend to study the moon, circumsolar space and deep space. In the 1984-1999 period, they plan to loft 78 spacecraft with varying specific purposes into near-earth space.

The weather satellites of the GMS series (Himawari) have been used by Japan since 1977 in a stationary orbit (subsatellite points of 120, 140 and 160 degrees E long). The system includes one or two satellites. The last launch of a GMS-3 satellite was in August 1984 and the next launch of the GMS-4 with a H-1 carrier rocket has been set for 1989.

Satellites of the national communications system series CS Sakura have been launched since 1977 also into a stationary orbit (subsatellite points of 132 and 135 degrees E long). The last launch of the CS-2B was in 1983. It weighed on the order of 350 kg and the estimated active functioning time is 3-5 years. The satellites are equipped with six relays with a frequency band of 20-30 gigahertz and two bands of 4-6 gigahertz which provide communications as a whole for 4,000 telephone channels. The foreign press has pointed out that a portion of the channels since March 1984 has been used in the military communications system of the National Defense Agency, in particular for communications with facilities on Iwo Jima. The next launch of a satellite of

the CS series (weighing 550 kg) has been planned for 1988 using a H-1 carrier rocket. The estimated time of its active operation has been increased to 7 years.

The satellites of the commercial communications system Intelsat-5 are to be employed as of 1988 in two communications systems. The satellite launch is to be made using the Western European Arian carrier rocket.

A Supercomsat communications satellite is planned for development in 1987-1991 for use in the future communications systems of the 1990s. The first such satellite weighing 2 tons with an active operating life of 4 years should be equipped with 60-70 relays providing communications over 100,000 telephone channels. The satellite is to be launched by a H-2 carrier rocket.

Radio and TV broadcasting relay satellites of the BS (Yuri) series are being launched into a stationary orbit (a subsatellite point of 110 degrees E long). These are also employed in communications systems. The first satellite (experimental) was launched in 1978, the second and third (BS-2A and -2B) in 1984 and 1986, respectively. The estimated time of active operation for the satellites is 5 years. The BS-2B (weight 350 kg) carries three transmitters using traveling wave tubes with a power of 100 watts each and using these it is possible to relay programs for two colored TV channels and one black and white channel. The satellite equipment is powered from a solar battery with a power of 750 watts.

The next launches of the satellites BS-3A and -3B have been planned for 1990 and 1991, respectively, using a H-1 carrier rocket. They will have a transmitter power of 120 watts and provide broadcasting over three color television channels. The launching of the BS-4 satellite is planned for 1996 and this satellite will operate on frequencies of 22-27 gigahertz.

A satellite for geodetic measurements of the EGP (experimental geodetic payload) type was put into an orbit 1,500 km high by a H-1 carrier rocket in 1986. This was developed by the Kawasaki firm and designed to conduct geodetic research and work on establishing triangulation grids. The weight of the satellite is 700 kg. The equipment has 218 solar ray reflectors and 120 lasers. The active operation time of the satellite is 5-7 years.

The satellites for studying earth and sea resources of the MOS and ERS series are a new type of satellite device for Japan. According to evidence in the foreign press, the programs for developing such equipment are being supported by the military agency which in the future plans to use the technological experience of developing and operating these satellites for establishing military intelligence systems. The first oceanographic satellite MOS-1 was lofted into orbit by a N-2 carrier rocket in February 1987. The satellite carried a multispectrum scanning radiometer, a radiometer for the infrared and visible bands and a scanning radiometer of the millimeter band. These devices are designed to measure the amount of vapor in the atmosphere, ocean currents, the color of the water surface, for conducting ice reconnaissance and studying the biosphere of the world ocean. In surveying the land, they will be used to locate fossil minerals, for evaluating water resources and for inventorying different types of lands. The MOS-1 weighs 750 kg and the estimated time of active operation is 2 years.

The program for developing the ERS satellites for investigating the earth's resources is closely linked to the program for the satellites of the MOS series. The first launch of the experimental satellite ERS-1 (weight 1.4 tons) is set for 1991. The satellites of this series are to be used for collecting information in the interests of geology, agriculture, forestry and fisheries, and for monitoring the environment and the coastal zone. As observation devices they will employ radiometers operating in the visible and infrared areas of the optical wave band and radar with a synthesized aperture capable of viewing a strip 75 km wide with a resolution of 25x25 m. Further plans envisage launches of two operational ERS-2 satellites in 1995 and two ERS-3 in 1998.

For developing applied-purpose spacecraft, Japan is carrying out a program of technical satellites of the ETS (Kiku) series where they will develop the devices and subsystems for future satellites. The launches of technical satellites have been made since 1975, and a total of four vehicles was launched. The launching of ETS-5 was planned for 1987 and ETS-6 for 1992.

A scientific research program led by the ISAS is to study both near-earth and far space. It has been announced, in particular, that within this program in 1984 they launched spacecraft for studying the atmosphere at altitudes of 30-100 km and in 1985, a spacecraft was sent to Halley's comet and in 1986, astronomical X-ray observations were carried out. In the immediate plans of the institute they plan to carry out the following tasks: research on the atmosphere using spacecraft of the EXOS series (weight 210 kg, orbit altitude at the perigee and apogee of 360 and 870 km, respectively, orbit inclination of 75.5 degrees), and for 1988 they have planned to launch the EXOS-C spacecraft for research in the plasma physics area; increasing the energy capabilities of the M-3S-2 carrier rocket by installing a fourth solid-fuel stage on it; launching in 1989, an automatic orbital lunar station (MUSES) weighing 170-180 kg; the development of a spacecraft for recording solar flares (launches in 1991-1992); studying the possibility of developing and launching spacecraft to study the planets.

The foreign press has pointed out that Japan is developing for the American Shuttle spacecraft a Spacelab-J platform to be used for Japanese astronauts to conduct a range of 34 experiments in producing materials in space (in particular, new alloys and medicines). Ten Japanese firms are to be involved in the work related to Japanese participation in the American program for a permanent orbital station. The projects involve designing a module

for conducting medical and biological experiments and research, and in addition, they plan to conduct production experiments involving two Japanese astronauts. They also intend to study the plans for developing an autonomous non-orbiting platform designed to carry out particularly delicate experiments under the conditions of weightlessness. The platform (weighing 24 tons and 13 m long) will be assembled at the permanent orbital station and then launched and controlled by its crew.

In 1986, Japan resumed research on developing its own reusable spacecraft of the minishuttle type designed to deliver men and freight to an orbital space station. Judging from announcements in the Western press, the main purpose in developing this spacecraft is to provide Japan with equal status in future competition to receive profits from the commercial use of spacecraft. Japanese specialists also feel that such a spacecraft in the arsenal of the nation's space vehicles can provide it with an appropriate level of secrecy in conducting various experiments in space.

According to the plans, a Japanese transport spacecraft with a launch weight of 10 tons and a crew of 2-4 persons can carry a payload up to 2 tons. The craft will be launched by a N-2 carrier rocket and landing will be on a conventional runway. The minishuttle will have a triangular-shaped wing with high-lift devices. In the first stage of the work under this project they plan to create a reduced unmanned version in the form of a highly maneuverable experimental space vehicle called HIMES and capable of delivering a payload weighing around 0.5 ton to an altitude of up to 300 km. One of the purposes of the device is to carry out research in the area of aerodynamics under the conditions of weightlessness. HIMES should provide a flight lasting up to 18 minutes and its take-off and landing will be carried out employing two liquid-fuel rocket engines. The launch weight of the device is 14.1 tons, the length is 13.7 m and the wing span is 9.14 m. In its control system they plan to employ equipment of the NAVSTAR satellite communications system as well as automatic landing devices operating in the millimeter band.

In September 1986, the Nakasone government took a decision for Japanese participation in research within the American Star Wars Program. In commenting on this decision, the Japanese press has been unanimous in its assessment that Tokyo thereby has demonstrated its Allied loyalty and a readiness to move farther along the path of strengthening the growing military-political collaboration with Washington. In order to somehow play down the militaristic essence of this program and get around the resolution adopted in 1969 by the Japanese legislators which limited space research exclusively to peaceful purposes, the Japanese government is making a maximum effort to publicize the scientific-technical, political and economic benefits which would supposedly come from participation in the Strategic Defense Initiative. As the Western press has shown, the Japanese firms intend to progress in research on developing modern types of computers, communications equipment and various types of ceramics while of greatest interest for the United States are the Japanese lasers, the optical and electronoptical devices.

The Soviet Union has expressed serious reservations over the negative consequences for the fate of peace from involving Japan in carrying out the U.S. plans aimed at developing attack space weapons and shifting the arms race into space.

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Combat Operations at Sea, Early Warning Questions

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[Article, published under the heading "Naval Forces," by Vice Adm I. Khurs: "Combat Operations at Sea and the Questions of Early Warning"]

[Text] The first part of the article* examined the views of the U.S. and NATO navy commands on the conduct of combat operations at sea, the basic tasks confronting the naval forces of the capitalist states as well as the change in the role and purpose of the arms of modern navies. Below, drawing on materials from the foreign press, we have taken up the questions of the carrying out of the tasks confronting the navies and the problems of early warning.

Naval operations against a coast. One of the most important tasks for the fleets remains, in the expression of American terminology, "the moving up of forces to the coast." In the designated operations a major place is held by the neutralizing of shore installations, destroying ships in ports and bases, and seizing the enemy coast by landing amphibious forces. In comparison with previous experience, in future fleet operations against the coast, there will be a significantly greater role played by submarines and surface vessels which, employing over-the-horizon range cruise missiles, will be able to operate against shore installations as part of the first wave forces.

Naval amphibious operations, as Western specialists feel, in the future will maintain their specific purpose which is to capture important areas on the enemy coast, its straits zones, islands, naval bases and ports.

In the process of the development of the naval amphibious forces in the capitalist countries particular importance has been given to increasing the landing rate of the forces by the vessels and by air and to the combat stability of the landing ships and vessels.

Modern naval thought in the West has paid a great deal of attention to blockade operations which comprise the basis of first operations to interdict the deployment of the enemy fleet into the ocean. The most acceptable methods of a blockade, as have been pointed out in the foreign press, are considered to be the blockading of ports, bases and straits zones ("control of the narrows"). It is assumed that the enemy along its coasts will have, as a rule, air superiority and for this reason submarines and mining weapons will be first of all the basic forces setting up the blockade.

The blockade of straits and narrows will be conducted by fleet, air and army forces with support on own and allied territories and this, in the estimate of NATO specialists, will ensure an echeloned configuration and high combat stability of the blockade forces and will increase the time for operating against the targets. The active use of antishipping missile systems as well as a developed air defense system is becoming an important feature in the carrying out of a blockade under the new conditions.

In the military plans of NATO, like the other alliances in the capitalist world, an important, if not the leading, place has been given to protecting the sea and ocean lines of communication which support their vitally important needs. In peacetime each day on the Atlantic there are more than 3,000 merchant vessels transporting raw products and finished goods essential to the NATO countries for the normal development of their economy. During the wartime the need for shipments will be increased due to the delivery of military cargo. In the estimate of NATO experts, for conducting hostilities it would be essential to deliver by sea to Europe during the first 3 months of a war over 2 million tons of combat equipment, 6 million tons of supplies and ammunition and 15 million tons of fuel and lubricants. Around 800 vessels will be involved each month in just these shipments. The great extent of the sealanes from the coast of the United States, Central America, Canada and the Persian Gulf to the ports of Europe, Japan and South Korea has caused, judging from information in the foreign press, serious concern among Western military strategists. The question is further complicated by the absence, in their opinion, of a sufficient number of forces for defending the sealanes. Moreover, in wartime the West will have to assign forces for defending the offshore oil and gas producing areas. In recent years, these have been widely developed and their proportional amount in the energy balance of the NATO countries has been constantly growing. In this context the defense of the sealanes which has an old history maintains its timeliness and is an object for study by foreign military specialists.

In recent years in NATO exercises they have worked out two methods for defending the sealanes and these have been termed "protecting the sealanes zone" and "mobile zone of control." The first assumes the conducting of specially organized combat by permanent naval groupings and by other armed services concentrated in specific operational zones. The aim of these operations is to destroy or force the enemy out of these zones. The designated method is employed chiefly on the beginning and terminal legs of the sealanes and in the areas of the forming (breaking up) of convoys.

In moves between the terminal points of the sealanes for large and particularly valuable convoys, they organize defense by the "mobile zone of control" method employing a direct escort for the transports, as was done in the years of World War II, as well as an operations cover which "clears the way" for the convoys against enemy forces. The given method presupposes the winning of full supremacy at sea and in the air along the convoy route.

In naval theaters of operations, depending upon the situation, for defending convoys they employ the same methods involving coastal forces as well as the shore and land forces. Along with this measures are provided to strengthen the convoy defenses by mounting special mobile systems including helicopters and antiaircraft weapons on the transports.

The views of foreign military specialists concerning the role of the navy and its combat arms as well as the use of them in operations have been tested out in the local postwar conflicts and wars. On this level, of interest is primarily the Anglo-Argentine conflict of 1982 in which the English achieved the aims of the operation basically with the aid of the navy. The foreign press has contained many rather contradictory statements on this conflict. They were published chiefly in the course of it or immediately after when there had not been sufficient time for a more profound study of the events which occurred. In a short period of time, the English were able to make up a task force which included over 120 ships and auxiliary vessels. Two carriers were the core of the force. One of the most important places was held by the 2 helicopter-landing dock ships and 6 submarines, including 5 nuclear ones. The actions of the main forces of the task force were supported by surface vessels of the destroyer and frigate classes (a total of over 30 units).

A particular feature of the conducted operation was the fact that the landing of the amphibious force began without the preliminary elimination of the main threat represented by aviation and the Argentine Navy. For this reason, simultaneously with the execution of the landing operation, battles were conducted for supremacy at sea and in the air. The English, counting on passive operations of the Argentine Navy, limited its activities to knocking out the main airfield at Port Stanley so that it could not be used by aircraft operating from the continental Argentine airfields.

The English kept their carriers virtually beyond the range of enemy aviation.

According to the materials in the foreign press, the early detection of Argentine aircraft attacking the English task force was basically provided by the antimissile radar

destroyers and frigates and from their data the carrier-based Sea Harrier vertical or short take-off and landing aircraft were guided to the targets.

The further repulsing of Argentine aircraft which had broken through was carried out by the on-board weapons of the surface ships. Firing positions at which there were three or four ships were established directly for the air defenses of the landing craft. A similar task was carried out for the aircraft carriers by their escort ships.

Due to the low activeness of the Argentine Navy the English surface ships were opposed chiefly by aviation. According to the estimate of Western specialists, the combat operations between them ended in favor of the English, although the Argentine aviation made 445 combat sorties.

The English in the course of the operation set up a close blockade on the Argentine coast and this was basically carried out by submarines. Moreover, for reconnoitering points of possible amphibious landing, reconnaissance and sabotage groups were widely used and these were landed from helicopters and submarines.

Foreign military specialists in analyzing the results of the conflict, feel that the surface vessels under these complicated conditions of an air threat, demonstrated sufficiently high combat stability and the tasks confronting them were carried out. At the same time, it has been pointed out that the English suffered heavy losses in ships chiefly due to the insufficient reliability of the air defense of the ship grouping. The great distance of the combat area from Great Britain (around 15,000 km) did not make it possible to utilize the Nimrod AWACS aircraft for early warning of air targets and the aircraft carriers did not have radar patrol aircraft and helicopters. Also felt was the lack on the ships of Sea Wolf antiaircraft missiles and these proved effective in the course of the operation, as they had a high degree of response. The safety design of the English ships was also poor and this has already begun to be considered in designing them. In particular, as the foreign press has announced, the new American antimissile destroyer of the "Orly Bjork" class which is presently on the ways for the first time in postwar practice will be completely out of steel, while aluminum alloys will be employed in very limited amounts. The most important quarters, the ammunition magazine, the launch silos and control stations will be protected by armor and "sunk" into the ship hull.

As has been stated in the foreign press, cruise missiles have led to radical changes in the strategy and tactics of naval operations, they have given them a modern offensive content and have brought about a new battle formation of the forces in combat, a revision of the role and purpose of the naval combat arms in operations and primarily the multipurpose submarines. In the course of the still unresolved "duel" between a missile strike and antimissile defense, a number of questions has risen on the organization of combat, and among these all levels of intelligence have become the crucial factor in success. Its role in combat operations is generally recognized. However, in modern combat characterized by the mass employment of missiles, the role of intelligence has risen, as Western specialists have pointed out, by a magnitude in comparison with the past.

The theory and practice of employing antishipping and cruise missiles and combating them have provided an opportunity to determine the demands on intelligence and set the ways for its development on the basis of a realistic assessment of the capabilities of the existing forces. The primary demand, in the opinion of foreign military specialists, is the capacity of intelligence to determine the employment of the ASM [antishipping missile] at an over-the-horizon range and for this the need has arisen to detect the missile carriers at distances exceeding the range of fire of the missile weapon. Here the target data should be received by the attacking ships on a real time scale. It is considered that without the availability of such data, the commander of the attacking ship (force) will not only be deprived of the opportunity to master the situation in the interests of employing the ASM but also will be unable to predict the course of combat. At the same time, in the assessment of foreign specialists, the on-board reconnaissance equipment of the ships is not fully capable of carrying out this task. Thus, on American ships the most dependable means is only the LEMPS helicopter system which is capable of employing the Harpoon ASM at a full range. In individual instances, depending upon the training level of the operators, target designation can be provided by radioelectronic intelligence and hydroacoustical equipment. At the same time, the detachments and forces do not have the possibility themselves of organizing strikes by Tomahawk-like ASM.

The next demand on intelligence stemming from the particular features of modern combat is felt to be constant monitoring of the enemy not only in the combat area but also in adjacent areas in the interests of the underway or approaching combat. The designated demand is based upon the following circumstances.

In the first place, without a knowledge of the over-the-horizon operational situation, for the task force there is a greater danger of being surprise-attacked. Secondly, under conditions when the fleets are armed with powerful missile weapons, the launching of an anticipatory strike and the struggle for the first rocket volley have assumed particular significance and these are fundamental in NATO tactics. Thirdly, although in the assessment of Western specialists, the capabilities of the presently existing intelligence equipment are incomparably higher than the past, they still can be disorganized and "blinded" by the enemy. It has also been pointed out that the enemy will employ measures to conceal its operations and to rapidly deploy its forces into the combat area. In

this context it is essential to secure advance information on the enemy and have its early detection, so that the command has sufficient time for promptly eliminating the threat of attack.

In the opinion of the Western specialists, intelligence under the conditions of modern combat will be carried out with a strong counteraction of the belligerents. It has been emphasized, moreover, that the period preceding the initiation of combat will be characterized by a contest between the intelligence agencies of the opposing sides and the "battle for information" will be crucial. Under new conditions, higher demands are also placed on providing reconnaissance information to the ships at sea. The necessity arises of receiving this by the strike forces directly from the high command or immediately from the intelligence forces and not by a circuitous route, as was permitted in practice in previous wars.

As has been pointed out in the foreign press, the shipboard intelligence equipment of surface vessels in terms of its technical performance has insufficient capability in terms of detecting the enemy and missiles fired by it. For example, for the frigates with an automatic weapons control system, with the existing capabilities for detecting the Exocet ASM (height of flight 2-3 m, effective scattering area of 0.1 m^2 and speed $M = 0.93$) by shipboard equipment, the total time from detecting the missile to launching the Sea Wolf antimissile missiles is around 47 seconds. During this time the missile would be less than 4 km from the defending ship, and the interception of the ASM by an antiaircraft missile can be expected only 54 seconds after detection (2 km from the ship). The most effective antiaircraft artillery system, the Vulcan-Phalanx, can be put into battle only in 4 seconds (1.1 km) before the ASM reaches the target. Similar arguments are valid in terms of the other existing ASM, but the time for repelling the strike is significantly shortened, when the attacking side employs supersonic ASM which are presently being developed. The carriers during the launch can be at a distance from 40 to several hundred km in employing, for example, the Tomahawk ASM.

Proceeding from this, Western specialists feel that the main objects of intelligence in the interest of supporting combat operations should be the carriers of ASM (surface vessels, aviation, submarines) as well as the missiles in the air.

For increasing reliability and creating maximum thoroughness, intelligence for a task force is organized by the forces of the separate groups (elements) of the battle formation dispersed in accord with the plan for launching the strikes and ensuring all types of defense. Here the tasks of tactical early warning are carried out by the deck-based aircraft of the carriers, by helicopters, surface vessels as well as submarines with long towed antennas and in the future, unmanned reconnaissance devices which go beyond the limits of the zone monitored by the shipboard equipment.

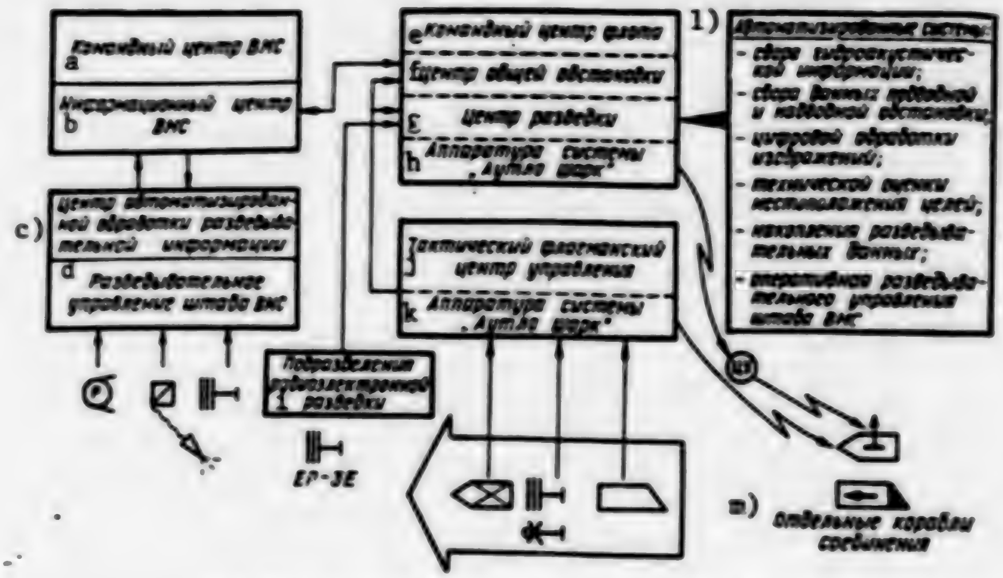
For providing early warning of a threat, on the forward lines they use forces operating with the rights of operational support and cover for the fleet forces at sea and keeping, as a rule, in the position of the superior or zone command. These are primarily the aircraft of land-based patrol and reconnaissance aviation, the long-range sonar surveillance system, the regional reconnaissance and observation systems and the reconnaissance satellites. The early warning system is also entrusted with the tasks of providing over-the-horizon target designation to all carriers of cruise missiles.

Presently, the West is working to broaden the arsenal of available forces. The attention of foreign specialists has been attracted to blimps and over-the-horizon radars. Judging from materials in the foreign press, the U.S. Navy has begun to carry out a long-range program for arming naval aviation in the 1990s with blimps designed "chiefly for patrolling and early warning." Certain American firms have received orders to work out the questions of detection of low-flying cruise missiles from blimps. In the opinion of Western specialists, the use of blimps for observation and over-the-horizon target designation provides economic and tactical benefits in comparison with the AWACS aircraft.

The U.S. Navy Command has begun to deploy its own system of over-the-horizon radars in the Pacific Zone. It is felt that this will increase the effectiveness of early warning for enemy air and surface targets in the interests of defending the task forces and the carrying out of offensive tasks by them.

The over-the-horizon radars, as is emphasized in the Western press, obviously will be developed by other countries. In particular, the Japanese military command considers it advisable to have such a radar for monitoring the airspace on the distant approaches to the coast. According to the plan, the designated radar will be part of a unified national air defense system and where the components can be AWACS aircraft based on the P-3AEW aircraft which should replace the early warning system presently deployed on the basis of the E-2C Hawkeye aircraft. For increasing the effectiveness of air defense for ships and vessels, they plan to supply the Air Force with tanker aircraft and introduce the multipurpose Aegis weapons system in the fleet.

The basis for collecting situational data on the naval theaters in the U.S. Navy is the OSIS observation information system with centers at the Command Center of the Navy Commander-in-Chief (the NOSIC information center) and at the command centers of the fleet commanders, including operations (the FOSIC and FOSIF information centers). All centers are equipped with facilities of the Outlaw Shark automated system. Versions of the same equipment can be found at the tactical flagship centers and on the individual carriers of ASM, and its displays exist in all the command centers of the fleet command center. All types of intelligence of the



U.S. Navy Early Warning and Target Designation System

Key:
a—Navy command center
b—Navy information center
c—Automated intelligence data processing center
d—Intelligence directorate of Navy Staff
e—Fleet command center
f—General situation center
g—Intelligence center
h—Equipment of Outlaw Shark system
i—Radioelectronic intelligence subunit
j—Tactical flagship control center
k—Equipment of Outlaw Shark system
l—Automated systems for collecting sonar information; collecting data of underwater and surface situation; digital processing of images; technical assessment of target positions; accumulation of intelligence data; operations for intelligence directorate of Navy Staff
m—Individual ships of force

navy and the other armed services are the information sources. The obtained information is concentrated in the information bodies of the OSIS system on a close to real time scale.

The work of developing automated system for collecting and processing situational data is being carried out in certain other countries.

For example, the foreign press has announced an English system of situation monitoring and control of combat and which has proven effective in exercises of the joint NATO navies. This is located at the operations center of the High Command Staff of the NATO Joint Armed Forces in the Eastern Atlantic at Northwood (Great Britain). The OPCON equipment installed there is designed for constantly monitoring the location of fighting ships and aviation of foreign and home naval forces. The information sources for the given system are strings of underwater hydrophones, the SOSUS early sonar observation system, the reconnaissance aviation and satellites, as well as the combat and auxiliary ships of the NATO bloc countries. The transmission of intelligence data to the operations control centers is carried out by tactical and strategic communications links using satellites.

The modern views of foreign military specialists on the theory and practice of conducting combat at sea reflect the aggressive essence of the naval strategy of imperialism, primarily American, and its anti-Soviet, antisocialist focus.

Footnote

* For the start of the article see: *Zarubezhnoye Voyennoye Obozreniye*, No 6, 1987, pp 47-53.—Editors.

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U.S. Air Force Arnold Engineering Development Center

18010004m Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 7, Jul 87 (signed to press 6 Jul 87) pp 67-72

[Article by Col V. Cheremushkin: "The U.S. Air Force Arnold Engineering Development Center"]

[Text] The most reactionary U.S. circles have not abandoned the attempts to block the realization of the common-human aspirations for a lessening of international tension and for a lasting peace in the world. In the course of the arms race unleashed by the military-industrial complex, great attention has been paid to a further build-up of the combat might of the American Air Force. For this purpose, U.S. imperialism has initiated the enormous production of diverse and constantly improving means of destruction and annihilation. This has been characterized by increased capital intensiveness and by an ever-growing scientific intensiveness. The U.S. Air Force Weapons System Development Command (WSDC) organized in 1951 is an important element in the great and widely developed scientific research apparatus involved in developing aviation and missile-space equipment.

As is pointed out in the American military press, the WSDC is responsible for organizing and carrying out fundamental and exploratory scientific research and developing weapons systems and combat equipment for the Air Force, it determines the ways for improving the existing weapons and the opportunities for developing new models, and it places and accepts orders in industry. Over 40 percent of all the funds of the Defense Department for research and development go to the Air Force research and development programs carried out chiefly by the WSDC. In 1987, over $17 billion are to go for these programs (including expenses on the upkeep and operation of scientific research centers and laboratories) and this significantly surpasses the level of the previous year.

The WSDC has under it scientific research and testing centers and laboratories. The largest testing facility of the Air Force is considered to be the Arnold Engineering Development Center or AEDC. Here work is also carried out in the interests of the other armed services, federal agencies and private companies. In 1985, the WSDC established the AEDC as the head one involved in researching and testing propulsion units, the aerodynamics of aviation and rocket-space equipment, ballistic missiles, and space-based systems. In addition, the center is responsible for conducting any testing the need for which can arise in developing new equipment.

Recently the role of the center has increased substantially due to the carrying out of projects under the SDI Program which even among the other militaristic programs requires enormous outlays on R and D. Judging from information in the foreign press, research within the Star Wars Program will gain the largest amount by 1990, but even now this is being carried out in many areas, in particular, for those involving the development of kinetic weapons and a high-altitude interceptor aircraft, and so forth.

The AEDC is located at the Arnold Air Station in Tallahoma, Tennessee, and occupies an area of 16,000 hectares. The climate in this area is subtropical and continental. The mean January temperature is +5 degrees C, July is +25 degrees C and 1,100-1,200 mm of precipitation falls annually.

In 1986, the center had around 4,000 permanent employees, including management personnel (350 servicemen and civilians), scientists, engineer and service personnel. Air Force servicemen are the leaders of all research programs. The AEDC has built over 40 test and research facilities of which seven are in the reserve and one has been mothballed. Over $2.5 billion have been spent on building them, in the estimate of American specialists. Each year the Arnold Center consumes an average of 400 million kilowatt hours of electric power.

Scientific equipment is least to private contracting firms which also conduct research. Acting as contractors are the firms Sverdrup Technologies, Calspan and Schneider Services. The employees of the first of these (over 1,000 persons) are basically engaged in testing engines on firing stands, the second (over 1,000 men) take and analyze aerodynamic performance as well as work out programs and test methods. The basic area of work for the last company is to support the execution of the research involving around 1,500 men. These contracting firms conclude contracts with the Air Force, as a rule, for 5 years on the basis of compensation for production outlays plus a remuneration. The amounts of the contracts in 1986 were, respectively, $51.3 million, $43.2 million and $104.8 million.

Along functional lines the test facilities at the AEDC are divided into three main areas: propulsion, aerodynamic and Carman Gasdynamics.

The propulsion research facility has the most complicated and modern equipment. This includes equipment for engine testing (ETF or Engine Testing Facility) and propulsion units and their systems (ASTF or Aeropropulsion Systems Test Facility). Among the main equipment of the ETF are the high-altitude stands or chambers (there is a total of around of 15 of them) designed for testing aviation and rocket engines of different types. A portion of the rigs is used for testing experimental engines in the development stage and others for experimental engines in the research stage. Among the rigs there are 5 which can simulate the conditions of altitudes to 40 km and create an air flow velocity up to M=3.2. The rigs for firing tests of the ballistic missile engines are designed for a thrust of up to 226 tons and are capable of testing rocket engines of less thrust and also engines for space vehicles. In the words of the AEDC leaders, the

ETF has conducted tests on all the propulsion units of satellites launched over the last 3 years. At the end of 1986, after rebuilding, the J-5 rig went back into service and this had been destroyed by a Minuteman-3 missile which blew up during testing in November 1985. One of the rigs for testing missiles and studying the expansion of jet exhausts under conditions simulating space is in reserve.

For testing future heavy-thrust engines in the 1960s they began building the facilities of the ASTF (with a cost of over $625 million), and the basic portion of its equipment went into use last year and makes it possible to test both gas turbine as well as ramjet engines. In the opinion of the center's scientists, this equipment will be able to satisfy not only current needs but also to a significant degree support experimental design work in the next century.

The Western press has given the main specifications of the ASTF testing rigs. Under conditions which simulate an altitude of 11 km, in them it is possible to create a current with a speed corresponding to the number M=3.8, while previously it was possible to obtain only M=3.0. With a pressure of 10.5 kg per cm^2, a mass air flow rate is provided up to 500 kg per second. For comparison, let us point out that at the NASA Lewis Research Center, this indicator is 209 kg per second. With a pressure of 3.5 kg per cm^2, the air flow reaches 657 kg per second, that is, 2 or 3 times more than at analogous rigs of NASA, the Navy and private firms. In the ASTF facilities it is possible to test engines with a thrust up to 34 tons (at sea level at a temperature of 14 degrees C). On other American test rigs, analogous research can be carried out only for engines with a thrust up to 20.5 tons. The required air temperature delivered to the chambers during the testing is provided by special units and can range from -73 degrees C to +550 degrees C. At the Navy Research Center in Trenton, it is possible to achieve a higher temperature, but here the air flow rate will be 4-fold less. The operating parts of the test chambers have a diameter of 8.5 m and a length of 26 m while in other similar chambers the figures do not exceed 6 and 18 m, respectively.

Each ASTF rig provides the possibility of transmitting data from sensors mounted on the tested object over 2,170 channels, while on analogous rigs at other research facilities of the nation, it is not more than 1,200. The system of checkout equipment on the units has been designed by the Grumman firm and makes it possible to monitor 226 varying parameters and display 1,700 indicators on a real time scale. For comparison of the actually recorded characteristics with the design ones they employ an IS/1200 Cray computer. The data which differ from the expected are immediately transmitted to the test control center for analysis while those which do correspond to the calculated go to the computer memory. The rate of processing the experimental results is rather high and the most crucial information is provided before the start of the subsequent tests.

The appropriate test conditions are maintained by an automatic control system (by the Science Applications firm) and this considers the method selected for them, the program and the current readings of the checkout equipment. A component element here is the mathematical model of the ASTF equipment. This makes it possible ahead of time to simulate all the testing, to calculate the results, to assess the behavior of the examined engines and quickly make corrections in the course of the testing. The design of the servomechanisms provides the possibility of altering the flow of air in such a manner that various maneuvers of the aircraft can be simulated and here the set speed and altitude conditions are provided 10 times faster than on other such rigs.

The extensive introduction of electronics has made it possible to reduce expenditures of time and resources on the testing. For example, the preparing of an engine for testing under a steady operating state required 30 minutes previously while on the ASTF just 3 minutes. In examining dynamic processes, 35 parameters can be recorded at a rate of 100 measurements per second for almost 1 minute. Over the same period of time on the new rigs it is possible to obtain twice the amount of information than on the ETF facilities and this shortens the equipment running time. AEDC specialists feel that the facilities of the ASTF make it possible to significantly reduce the engine development cycle and in certain instances even by 4 years.

There are plans for developing equipment to test propulsion units and their systems and according to this they are to build another 4 rigs and connect the air supply systems to the ETF systems for widening the capabilities of this facility.

The ETF has studied over 80 different gas turbine engines, the systems of the power and propulsion units of aerospace vehicles and virtually all the solid-fuel engines in the last stages of ballistic missiles. In 1986, here they tested the durability and the readiness for action of the fourth stages of five Minuteman ICBM after they had been in silos for 15 years.

The equipment of the aerodynamic facility includes several specialized wind tunnels in which they can experimentally study the phenomena accompanying air flow around a body, they can determine the forces arising during the flight of aircraft, missiles and spacecraft as well as resolve other questions. In the large wind tunnels at the facility—both subsonic and supersonic (with an effective diameter of 4.8 m), they can conduct research on full-scale parts of the airframe together with the power units at flow velocities corresponding to the M-numbers=0.5-4.75 and pressures corresponding to altitudes over 70 km. The large transonic wind tunnel is used chiefly for an analysis of processes occurring in the dropping of bombs, the firing of missiles and the separating of other combat mountings from aircraft.

Moreover, several smaller size wind tunnels have been built designed for testing models which are geometrically similar to the actual objects at various speeds. On special rigs using arc heaters they can study the erosion of structural materials under the conditions of pure and polluted air at high temperatures and pressures and the heating and thermal insulating of the missiles and supersonic aircraft.

For widening the capabilities of the specialized wind tunnels for conducting various testing and for shortening their cycle, periodically the equipment undergoes modernization. In particular, in the large supersonic wind tunnel they have installed a computer-guided sting which holds the model in different positions. The angle of attack can be changed within the limits of from -20 degrees to +87 degrees and the yaw to 15 degrees. This makes it possible to vary the stress on the model and to determine the capabilities of dynamic stability. A special device has been developed (it has 6 degrees of freedom and is computer controlled) for simulating the flight of ammunition released from an aircraft along a trajectory corresponding to movement under real conditions. This can operate both with the transonic as well as the supersonic wind tunnel. In individual assemblies of the latter, they have made design changes which has increased its economy from 9 to 16 percent under various modes.

Recently, judging from data in the Western press, the aerodynamic facility has carried out such very significant programs as testing samples for impact loads at low velocities and aerodynamic research on the Trident ballistic missiles (for the Navy), the development of telemetering systems, the testing of antisatellite small-size interceptors for the ASAT missiles*, vacuum and temperature testing for the elements of a satellite navigation system, the testing for impact and vibration loads and the g-loads of the rocket engine systems and the experimental X-29 aircraft with a swept-forward wing and so forth. According to press information, during the testing of the model of this aircraft in the supersonic wind tunnel, its performance was analyzed at high angles of attack and speed. In determining the same data in the course of flight testing, it would take 10 flights with additional expenditures of $0.5 million.

The Carman Gasdynamic facility has around 20 units used for investigating the air flow over diverse aerospace objects and conducting thorough fundamental research. The super- and hypersonic wind tunnels make it possible to test models at velocities corresponding to the M numbers: from 1.5 to 6 in the A tunnel, from 6 to 8 in the B and up to 10 in the C. In other wind tunnels it is possible to achieve values of M20. The 16T tunnel provides a model wind tunnel test within a range of velocities of M=0.06-1.6 under altitude conditions ranging from sea level to 30 km. The 4T transonic tunnel is equipped with a special trap and is designed to study the release from aircraft of payloads, fuel tanks and so forth. Here they also have tested virtually all the Air Force aircraft which have such stresses.

The object of study on two facilities (H-1 and H-1) are the protective coverings on equipment returned from space. The facilities have adjustable nozzles making it possible to create the appropriate conditions and study ablation and erosion of the materials. In the Mk1 chamber, a simulator of space conditions (with dimensions of 12x24 m) they conduct research on the thermal emission of objects in a satellite navigation system and test individual rocket stages. The 7V facility for space research is employed for testing and calibrating infrared-band sensors and on it they are also conducting intense work in the Star Wars Program.

Experiments are extensively conducted on the G hyperballistic range where they test structural materials of the nose cones of supersonic aircraft and missiles at speeds up to 7,300 m a second and under conditions corresponding to altitudes of up to 73 km. On another range some 18.3 m long, they assess the capabilities of the wind shields in the canopies of aircraft cockpits, the leading edges of wings and other parts and assemblies to withstand impacts in colliding with birds. During the testing they fire from an air cannon a container carrying a chicken carcass weighing 1.9 kg at a speed of around 925 km an hour. In leaving the barrel, the container opens and separates and the carcass continues to move until impacting with the object. In 1986, almost 30 such tests were conducted. The hypersonic S-1 range is used basically for studying the influence of impact loads of mechanical particles of varying origin on the tested materials.

The centrifuges, vibration and impact rigs of the given facility are used for testing the reliability of rocket engines and nozzles. The 10V and 12V chambers are simulators of space conditions and are kept in reserve. In the first it is possible to create conditions simulating altitudes up to 320 km. They have dimensions making it possible to place inside them full-scale spacecraft, satellites or individual elements.

As the scientific co-workers of the Arnold Center assume, certain research in the near future will assume a definite priority. For example, attention has increased on the transonic velocities (in this range, specialists are particularly interested in the process of the separating of combat loads from an aircraft and for studying this they plan to build a new wind tunnel), in aerodynamics at velocities of M=4-10, in the influence of temperature in low-altitude flights, in flights at hypersonic speeds at great altitudes as well as the particular features of the flow over objects of significant elongation.

The Defense Department and NASA have begun to work again on developing high-efficiency gas turbine engines and wings of varying configuration for super- and hypersonic aircraft employing vertical or shortened take-off and landing.

Considering up to the mid-1990s, the SDI will remain the largest research program of the Pentagon, the AEDC is planning to build a facility for testing and evaluating space systems (Space Systems Test and Evaluation Facility) and primarily space reconnaissance systems. They have already completed projects carried out by private firms valued at $1.3 billion to determine the composition of the equipment and the direction of research and for creating test procedures. As the Western press has shown, the facility will provide an opportunity to simulate space conditions with a high degree of accuracy and work through flight scenarios, including actions in emergency situation.

The kinetic weapons being developed for Star Wars has required testing of various elements under high acceleration conditions. In the hyperballistic range which can simulate conditions of altitudes up to 61 km, a velocity up to 6 km a second and acceleration of 60,000 g, they are already at work studying the stability of radio transmitters and storage batteries against mechanical stresses. Here they are also studying the effect of snow, water and dust on the process of eroding the surfaces of shells with a caliber up to 76 mm. On the G range they plan to build an electromagnetic accelerating device at which it would be possible to obtain acceleration up to 150,000 g. For recording the processes during the flight of the shell, they are employing modern methods and equipment, including various types of laser photography, X-ray photography, photoelectric pyrometry and others.

The AEDC administration is endeavoring to forecast the operation of the scientific research and testing equipment for a period of 7 years with an annual adjustment in the proposed programs. In accord with this each year the center's leadership requests from potential customers their needs for a 7-year period indicating the type of work, the number of tests, the approximate time for using the equipment. However, in practice it is difficult for the clients to prepare a precise list of everything necessary for such a distant future. For this reason in actual terms the program is being drawn up for 3-5 years and preliminary agreements are concluded for the same period. Considering the possibility of the appearance of future technologies, the funds are being estimated necessary for carrying them out, the possible earnings from contracts are being set and the necessary technical facilities determined. Ordinarily 6 months prior to the start of the testing a meeting is organized between the representatives of the center and the client and in the course of this the aim of the work is concretized, and the conformity of the model (sample) to be tested to the capabilities of the equipment is clarified. Four months before the start of the research, the program, the procedures and the equipment to be used are confirmed, and 2 months before a final contract is signed for the work and the client transfers the money. Certain private companies join up for conducting research. Thus, Boeing, Martin Marietta and McDonnell Douglas have carried out a joint program (under the code name High Temple) to assess composite materials under high-temperature conditions for tactical missiles being developed by the firms.

The annual budget of the AEDC (as an average for recent years) has been around $250 million. This is formed from receipts (a little more than 100 million) under contracts both with government and private clients as well as funds allocated directly by the Air Force Department.

At present, they are carrying out or will soon begin testing for the Research on 85 aerospace programs, 8 for the Navy, 6 in the interests of the Army, 7 for NASA and more than 6 for private firms.

Footnote

* For more detail on the ASAT missile see: *Zarubezhnoye Voyennoye Obozreniye*, No 4, 1983, p 46.—Editors.

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Airfield on Falkland (Malvinas) Islands

18010004n Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 7, Jul 87 (signed to press 6 Jul 87) p 74

[Article by Capt 2d Rank (Res) V. Maslov: "An Airfield on the Falkland (Malvinas) Islands"]

[Text] In militarizing the Falkland (Malvinas) Islands in the aim of reinforcing its military presence in the South Atlantic, Great Britain has continued to develop here infrastructure elements the main ones being the floating facilities for working ships* and the Mount Pleasant Airfield. Judging from information in the Western press, the British military leadership feels that with the presence of these facilities it will be able, in the event of necessity, to rapidly boost its armed forces there. The construction of the airfield which is 50 km to the west of Port Stanley has been carried out in two stages. In the first which lasted 2 years (designing 8 months, construction 16 months), they built the main runway which was 2,590 m long, a larger portion of the aircraft parking areas, a hangar, the main power plant, the airfield services buildings, the passenger air terminal and a new road linking the airfield to Port Stanley.

With the start of work, for unloading building materials and equipment in an area of the coast closest to the construction site they moored the supply vessel "Merchant Providence" with a tonnage of 13,000 tons and which played the role of a pier and a warehouse. It was linked to the shore by a floating bridge. For unloading arriving vessels they used one 150-ton crane and two 22-ton cranes. Construction was provided with concrete and asphalt from specially built plants. In the course of

the first stage of construction, 80,000 m^3 of concrete and 160,000 tons of asphalt were laid. During the second stage which ended at the beginning of 1986, an additional runway some 1,500 m long was built intersecting the main runway; construction was completed on the aircraft parking areas, servicing areas, barracks for the Air Force personnel and a flight command post. It had been assumed that the construction of the airfield would cost 300 million pounds sterling but in fact some 430 million were spent.

For providing air defense for the airfield, a Mk4 system (produced by the Ferranti firm) was deployed and this includes two radar stations with an air target detection range of up to 400 km. The total cost of the system is 24 million pounds sterling. For providing air defense against low-flying enemy aircraft in the region of the airfield, they have deployed one of the four squadrons (eight launchers) of the wing of Rapier surface-to-air guided missiles which is part of the Air Force and permanently stationed in West Germany. The squadrons relieve one another on the Falkland (Malvinas) Islands. Communication with the Air Force Command is provided by a radio relay link to the communications satellite station located at Port Stanley and which automatically relays the signals via the Intelsat communications satellite.

Permanently stationed at the Mount Pleasant Airfield is a separate fighter squadron of the Royal Air Force and periodically there are subunits of Bucaneer and Harrier aircraft and different types of helicopters. As has been stated in the foreign press, when necessary the airfield can handle aircraft of the Tristar, VC.10 and C-130 Hercules types carrying troops and combat equipment.

Footnote

* For more detail on this see *Zarubezhnoye Voyennoye Obozreniye*, No 12, 1985, p 89.—Editors.

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Accident Rate in U.S. Military Aviation

18010004o Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 7, Jul 87 (signed to press 6 Jul 87) pp 75-76

[Article by Col V. Sterkin: "The Accident Rate in U.S. Military Aviation"]

[Text] The American press has given certain data on the accident rate in the aviation of the Armed Forces. In accord with the accepted classification, it is a question only of category A accidents, that is, disasters (involving the loss of life) and accidents resulting in the destruction of an aircraft or causing harm amounting to $500,000 and more. It has been pointed out that the number of such accidents in the 1986 fiscal year, in comparison with the previous 12 months as a whole, for the Defense Department had decline from 179 to 162. Here, while the absolute number of accidents declined by 9 percent, their relative number (per 100,000 flying hours) declined by 11 percent and was 2.23, however more potentially dangerous flights were made.

At the same time, judging from the information of the foreign press, the total number of serious flight accidents in military aviation has remained rather significant while the change in their level in the aviation of the armed services has occurred unevenly (see the table). In Army Aviation, for example, in comparison with the previous year it declined by 33 percent, and in Marine Aviation by 27 percent. In Naval Aviation this indicator, on the contrary, increased by 23 percent, although in recent years here there has been a tendency for a drop in the number of accidents, with a minimum in the 1985 fiscal year. In terms of the relative number of accidents in 1985 and 1986 fiscal years, Naval Aviation surpassed the aviation of the other armed services while for Marine Aviation this indicator was approximately 2-fold higher than as an average for the Defense Department. Navy experts have not been able to reach an unanimous opinion on the reasons for such a phenomenon.

Distribution of Category A Flight Accidents by Aviation of Armed Services

Aviation	Total Flying Time, million hours[1]	Number of Accidents[1]	Number of Accidents Per 100,000 Flying Hours[1]	Change in 1986 Fiscal Year in Relation to 1985.
Army	.166[2]	33	1.98	-33
	1.53	45	2.94	
Air Force	3.46	53	1.53	-14
	3.48	62	1.78	
Navy	2.14	76	3.55	+6
	2.14	72	3.36	
Including:				
Navy	1.71	58	3.39	+23
	1.70	47	2.76	
Marines	0.43	18	4.18	-27
	0.44	25	5.71	
Total for Defense Department	7.27	162	2.23	-11
	7.15	179	2.50	

[1] Numerator shows data for 1986 fiscal year, denominator for 1985.

[2] Because of rounding off the figures, the total result may not coincide with the total of the individual indicators.

Official representatives from the Pentagon feel that the decline in the number of accidents and disasters has largely been a consequence of the more intense training of flight personnel on simulators, where it is possible to simulate emergency situations. It has been emphasized that it is particularly beneficial to work out the skills of those actions which are either difficult or impossible to master in a real flight. Among the other factors, mention has been made of the extensive employment on transport aircraft of devices which warn the pilot of a dangerous approach to the earth. At present, similar equipment is being tested for high-speed aircraft but, as was pointed out in the foreign press, as yet it does not meet the flying conditions of a fighter pilot, it is undependable and can provide erroneous information which is even more dangerous than a lack of it.

A major role in preventing accidents, experts from the U.S. Defense Department have stated, has been played by the constant attention paid by the commanders of all levels (including the command of the armed services) to the questions of ensuring flight safety as well as improving the skills of the ground service personnel and particularly the quality of training for young specialists and improving the design of the aircraft.

They have begun to more widely employ in-flight recording equipment for an analysis of the reasons for accidents. The instruments carried on civilian aircraft have been installed over the decades and in recent years have begun to also be employed in military aviation.

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Soviet Military Journal on New U.S. Radars

18010004p Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 7, Jul 87 (signed to press 6 Jul 87) p 77

[Article by Col V. Mitrich: "Deployment of the New BIMEWS Radar System"]

[Text] The U.S. military-political leadership, in carrying out a course of preparing for an aggressive war, has given attention not only to building up the might of the offensive forces but also to developing antimissile defenses. As has been announced in the Western military press, the United States intends to build new large radars at the radar stations of the BIMEWS nuclear missile attack warning system.

One of these, a powerful station with two phased antenna arrays (PAA) has been built under the guise of "modernization" in the area of Thule, Greenland. Work was done by specialists from the American Ratheon firm. In terms of its design, it is similar to the AN/FPS-115 radar of the Pave Paws system.

Another, more powerful radar of analogous type is planned for development at Failingdales Moor (Northern England). The antenna system of the radar will consist of three PAA. This will make it possible to provide all-round scanning, and here the accuracy of its radar measurements will be significantly higher than in the presently used AN/FPS-49. According to the data of the journal *International Defense Review*, the target detection range will be around 4,800 km and the warning time up to 8 minutes (the time from the moment of detection and the issuing of data on the ballistic targets to their strike in the designated areas). New computers will also be installed for controlling the operating modes of the radars and for processing information. The data from the radar post will go to the main NORAD Command Post (Colorado Springs).

They plan to begin carrying out the project in 1988 and complete it in 1990. The cost of all the work will be 250 million pounds sterling, of which 90 percent will be paid by the United States and the remainder by Great Britain. Great Britain is to be responsible for the erection of the buildings and other auxiliary facilities where the equipment will be located. It is assumed that it will be served by servicemen from the Royal Air Force. The new radar, in addition to operating in a tracking mode, will also be operated in a ballistic target detection mode and here as a whole the performance of the station, according to information in the foreign press, will increase by 20-fold.

The planned measures, even in the opinion of certain American specialists in the arms control area, are a violation of the 1972 treaty between the USSR and the United States on limiting antimissile defense systems. Contrary to Article VI of the Treaty which stipulates that each side agrees "not to deploy in the future warning radars for the attack of strategic ballistic missiles, with the exception of those in positions along the periphery of their national territory and located facing outward," the Reagan Administration has asserted that the construction of these radars is permitted because the United States is supposedly not deploying new radars but is "modernizing" the already developed. This is yet another example of the policy being carried out by the United States to undermine the ABM Treaty.

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Articles Not Translated in ZARUBEZHNOYE VOYENNOYE OBOZRENIYE No 7, Jul 87

18010004q Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian, No 7, Jul 87(signed to press 6 Jul 87)

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